

## **Appendix H      Traffic Impact Analysis**



City of Huntington Beach  
**THE RIPCURL**

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Traffic Analysis

July 2008



DRAFT

**City of Huntington Beach  
THE RIPCURL TRAFFIC ANALYSIS**

Prepared by:

**Austin-Foust Associates, Inc.**  
2223 Wellington Avenue, Suite 300  
Santa Ana, California 92701-3161  
(714) 667-0496

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# Chapter 1.0

## INTRODUCTION

This report summarizes the results of a traffic study for The Ripcurl Project in the City of Huntington Beach. The study provides the technical information for the Circulation section of the Environmental Impact Report (EIR) being prepared for this project.

### BACKGROUND AND SCOPE

The proposed project is located on the southeast corner of Gothard Street and Center Avenue. It is a mixed-use residential and commercial development with 440 dwelling units and 10,000 square feet of commercial space. These uses will replace an existing center known as College Country Center, which has 60,000 square feet of office and commercial space.

The traffic study provides both a short-range and long-range impact analysis of the proposed project. The short-range analysis addresses conditions shortly after project completion and identifies project impacts related to additional traffic on the surrounding area street system in this time frame. The long-range analyzes the project in a General Plan context. Traffic analysis data sets presented in this traffic study are thereby as follows:

1. Short-range no-project
2. Short-range with-project
3. Long-range with General Plan land uses
4. Long-range with Proposed Project land uses

For the impact analysis, the additional trips that will be generated by the proposed uses versus the existing uses are calculated. These trips are then added to the no-project background conditions to show the impacts of the proposed project.

For the short-range analysis, background (no-project) conditions are established by interpolating between existing and long-range volumes. This accounts for ambient growth, including development anticipated to occur in this short-range time frame. The short-range analysis time frame is referred to as

2014, which is one year after anticipated project occupancy. This time frame thereby fully accounts for project buildout and also addresses Growth Management Plan (GMP) and Congestion Management Program (CMP) needs for a short-range (five to seven year) time frame.

The long-range analysis compares the current General Plan land uses with those proposed by the proposed project (i.e., a “plan to plan” analysis).

Year 2030 forecasts are produced using the Huntington Beach Traffic Model (HBTM). This is a subarea model derived from the Orange County Transportation Analysis Model (OCTAM), following the consistency guidelines established by the Orange County Transportation Authority (OCTA).

Performance criteria appropriate for the jurisdictions involved (City of Westminster and Caltrans in addition to the City of Huntington Beach) are applied to the traffic volume data. These performance criteria use peak hour intersection volumes to measure level of service (LOS) and to define levels of significance for EIR purposes (see later section of this chapter).

To establish the trip generation basis for the project, a special analysis has been carried out to identify applicable trip rates for the residential uses in the context of a mixed-use project adjacent to a regional retail center and community college. The resulting trip generation reflects trip generation features such as local trip capture.

Consistent with the requirements of an EIR, only committed roadway improvements have been assumed, even for the long-range analysis using General Plan buildout land uses. A discussion of the assumptions in the committed network is given in Chapter 2.0.

## **PERFORMANCE CRITERIA**

The performance criteria used for evaluating volumes and capacities on the City street system are based on peak hour intersection volumes. Using peak hour intersection turn movement volumes and the intersection lane geometry, intersection capacity utilization (ICU) values are calculated for each of the AM and PM peak hours. The ICU values represent volume/capacity (V/C) ratios for these time periods, and thereby provide a suitable measure of system performance. For Caltrans intersections, the delay-based methodology, as contained in the Highway Capacity Manual (HCM), is also used (i.e., both ICU values and average delay are calculated for these intersections).

Table 1-1 summarizes the criteria used for the LOS calculations and the relationship between ICU, average vehicle delay, and LOS. The significance criteria for intersections based on ICU contribution is also listed in the table. This is used for both City and Caltrans intersections (the delay calculations are used only to verify the LOS results as calculated from the ICU values).

Table 1-2 describes traffic flow quality for different V/C and vehicle delay ranges. Traffic levels of service are designated “A” through “F”, with LOS “A” representing free flow conditions and LOS “F” representing severe traffic congestion. As listed in the previously referenced performance criteria table, LOS “D” (ICU not to exceed .90) is the performance standard that has been adopted by the Cities of Huntington Beach and Westminster, whereas LOS “E” (ICU not to exceed 1.00) is the performance standard for Orange County Congestion Management Program (CMP) intersections. Two CMP intersections are located in the study area:

Beach Boulevard at Edinger Avenue  
Beach Boulevard at Warner Avenue

Although LOS “E” is acceptable for CMP purposes at these locations, the City performance standard of LOS “D” is typically used in traffic analysis applications.

Freeway interchange ramps are also included in the analysis and Table 1-3 summarizes the criteria used for freeway ramps. The analysis is based on peak hour V/C ratios, with capacity being a function of the particular operating characteristics of each ramp.

## **STUDY AREA**

A study area has been defined according to the potential impacts of the proposed project. For peak hour intersection analyses, the one percent significance threshold generally translates to around 10 peak hour vehicles or more entering an intersection (since most intersections in the area have more than 1,000 vehicles per hour entering in the critical movements). Hence, this criterion has been used in selecting intersections for the impact analysis.

Table 1-1

## CIRCULATION SYSTEM PERFORMANCE CRITERIA

The following are the performance criteria used for comparing volumes and capacities on the study area street system:

### I. PEAK HOUR INTERSECTION VOLUMES

Intersection capacity utilization (ICU) values calculated as follows:

Saturation Flow Rate: 1,700 vehicles per hour (VPH).

Clearance Interval: .05 ICU

#### Performance Standard

- Arterial intersections to achieve level of service (LOS) D or better (ICU not to exceed .90)
- Orange County Congestion Management Program (CMP) designated intersections to achieve LOS E or better (ICU not to exceed 1.00)

LOS ranges for ICU values are as follows:

ICU	LOS
0.00 – 0.60	A
0.61 – 0.70	B
0.71 – 0.80	C
0.81 – 0.90	D
0.91 – 1.00	E
Above 1.00	F

#### Significance Criteria

Project causes a significant impact if it contributes .01 or more to an ICU when the performance standard is exceeded.

### II. CALTRANS INTERSECTIONS AND UNSIGNALIZED ACCESS INTERSECTIONS

Intersection LOS based on average vehicle delay in seconds as calculated using Highway Capacity Manual (HCM) procedures. Performance standard as above, and LOS values for average vehicle delay are as follows:

Level of Service	Signalized	Unsignalized
A	0 – 10.00	0 – 10.00
B	10.01 – 20.00	10.01 – 15.00
C	20.01 – 35.00	15.01 – 25.00
D	35.01 – 55.00	25.01 – 35.00
E	55.01 – 80.00	35.01 – 50.00
F	80.01 and up	50.01 and up

Table 1-2

## LEVEL OF SERVICE DESCRIPTIONS – SIGNALIZED INTERSECTIONS

Levels of service (LOS) for signalized intersections are defined in terms of control delay as follows:

<b>LOS</b>	<b>Description</b>	<b>Delay Per Vehicle (secs)</b>
A	LOS A describes operations with low control delay, up to 10 seconds per vehicle. This LOS occurs when progression is extremely favorable and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.	< 10
B	LOS B describes operations with control delay greater than 10 and up to 20 seconds per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than the LOS A, causing higher levels of delay.	10 – 20
C	LOS C describes operations with control delay greater than 20 and up to 35 seconds per vehicle. These higher delays may result from only fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. Cycle failure occurs when a given green phase does not serve queued vehicles, and overflows occur. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.	20 – 35
D	LOS D describes operations with control delay greater than 35 and up to 55 seconds per vehicle. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, and high V/C ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	35 – 55
E	LOS E describes operations with control delay greater than 55 and up to 80 seconds per vehicle. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent.	55 – 80
F	LOS F describes operations with control delay in excess of 80 seconds per vehicle. This level, considered unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of lane groups. It may also occur at high V/C ratios with many individual cycle failures. Poor progression and long cycle lengths may also contribute significantly to high delay levels.	> 80

Source: Highway Capacity Manual 2000, Transportation Research Board, National Research Council

Table 1-3

**FREEWAY RAMP PERFORMANCE CRITERIA**

**V/C Calculation Methodology**

Level of service to be based on peak hour volume/capacity (V/C) ratios calculated using the following ramp capacities:

**Metered On-Ramps**

A maximum capacity of 900 vehicles per hour (vph) for a one-lane metered on-ramp with only one mixed-flow lane at the meter.

A maximum capacity of 1,080 (20 percent greater than 900) vph for a one-lane metered on-ramp with one mixed-flow lane at the meter plus one HOV preferential lane at the meter.

A maximum capacity of 1,500 vph for a one-lane metered on-ramp with two mixed-flow lanes at the meter.

A maximum capacity of 1,800 vph for a two-lane metered on-ramp with two mixed-flow lanes at the meter.

**Non-Metered On-Ramps and Off-Ramps**

A maximum capacity of 1,500 vph for a one-lane ramp (convergence/Divergence point)\*.

A maximum capacity of 2,250 (50 percent greater than 1,500) vph for a two-lane on-ramp that tapers to one merge lane at or beyond the freeway mainline gore point and for a two-lane off-ramp with only one auxiliary lane.

A maximum capacity of 3,000 vph for a two-lane on-ramp that does not taper to one merge lane and for a two-lane off-ramp with two auxiliary lanes.

**Performance Standard**

Level of Service “E” (peak hour V/C less than or equal to 1.00).

**Significance Criteria**

Project causes a significant impact if it contributes .01 or more to a ramp V/C ratio when the performance standard is exceeded.

\* Assumes that the lane widens out to provide adequate capacity at the intersection (otherwise, capacity reduces to 1,200 vph).

# Chapter 2.0

## TRANSPORTATION SETTING

This chapter describes the transportation setting for the proposed project. Existing conditions for the study area circulation system are first summarized, followed by the future background setting against which project impacts are evaluated.

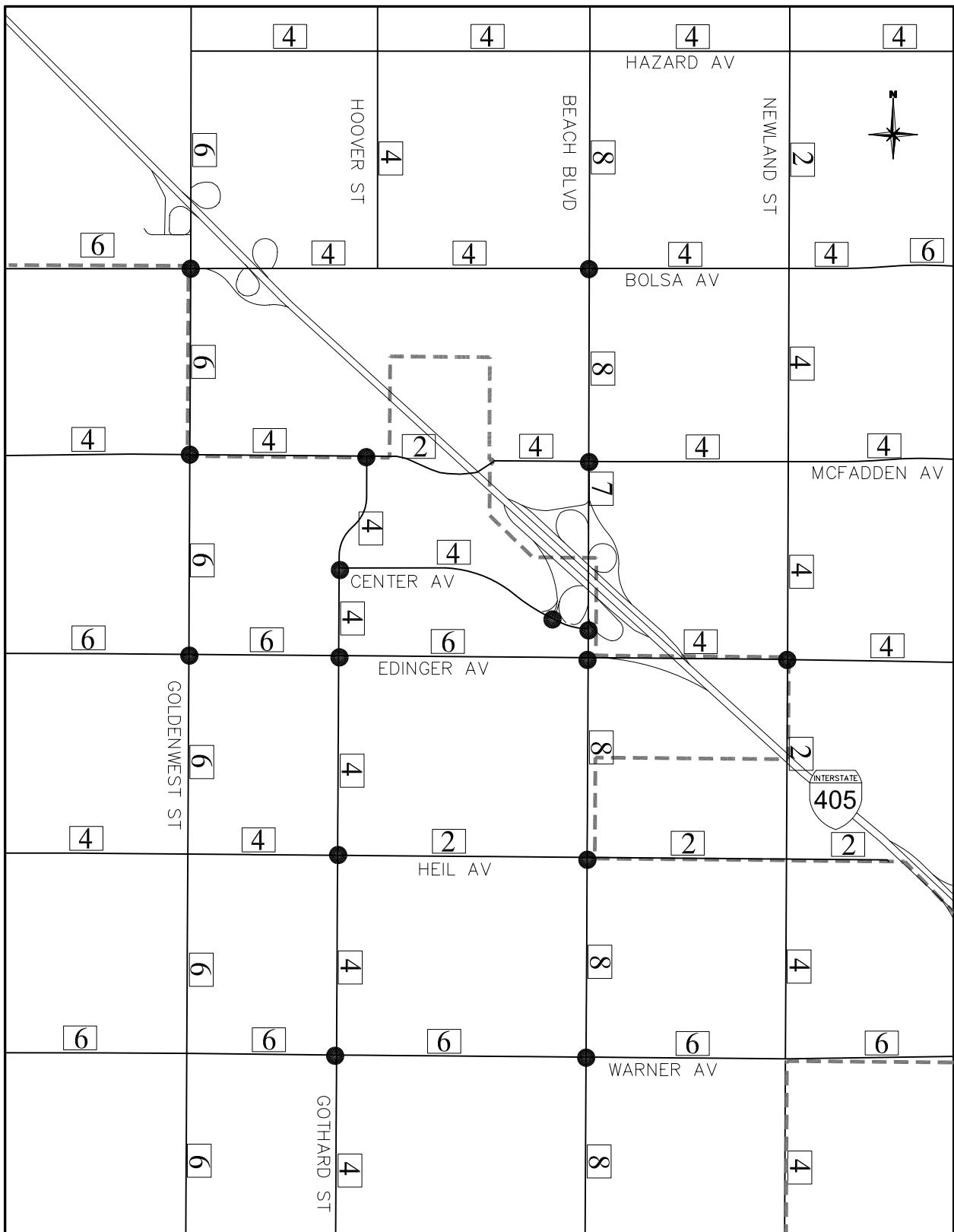
### EXISTING CONDITIONS

The study area circulation system is shown in Figure 2-1 along with existing midblock lanes and intersection controls. The existing (2006) average daily traffic (ADT) volumes in the study area are presented in Figure 2-2. Arterial roadways in the vicinity of the project include Gothard Street with 15,000 ADT, Center Avenue with 10,000 ADT, and Edinger Avenue with 30,000 ADT.

As described in the performance criteria section in Chapter 1.0, the intersection levels of service (LOS) are measured by peak hour intersection capacity utilization (ICU) values. For Caltrans intersections (along Beach Boulevard) average vehicle delay calculations are also made using the Highway Capacity Manual (HCM) methodology.

Existing peak hour intersection volumes are illustrated in Figures 2-3 and 2-4 for the AM and PM peak hours, respectively. The corresponding levels of service are summarized in Table 2-1 (an intersection location diagram is provided in Figure 2-5.) The calculations for the ICU values in this table can be found in Appendix A and the HCM calculations are in Appendix B.

The existing conditions summary shows all intersections to be operating at LOS “D” or better with the exception of Beach Boulevard at Edinger Avenue during the AM and PM peak hours. While the theoretical ICU indicates LOS “D”, the operational LOS is “E” as indicated by the HCM results. This is due to eastbound and northbound lane utilization being less than optimum. The eastbound traffic is concentrated in the right lane in preparation for accessing the I-405 southbound freeway ramp. The northbound traffic merges from four lanes to three through lanes just prior to the intersection (the fourth lane becomes a right turn lane). This merge plus local driveway traffic weaving against traffic in the right turn lane causes flow rates to deteriorate such that queuing occurs at peak times.



Legend

- |  |                |  |                               |
|--|----------------|--|-------------------------------|
|  | Midblock Lanes |  | Signalized Intersection       |
|  | City Limits    |  | analyzed in the traffic study |

Figure 2-1

#### EXISTING CIRCULATION SYSTEM

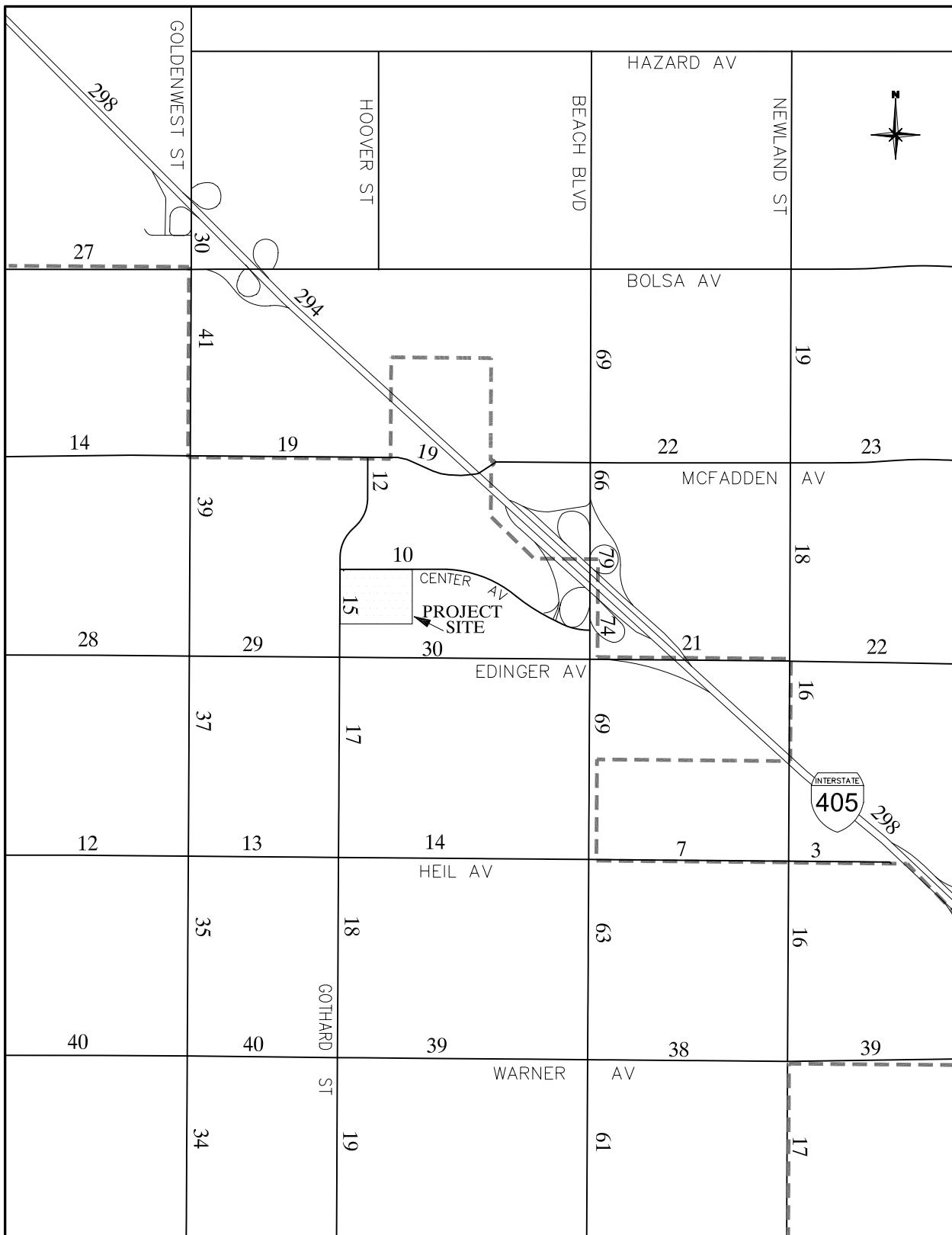


Figure 2-2

STUDY AREA ADT VOLUMES (000s)  
- EXISTING (2006)

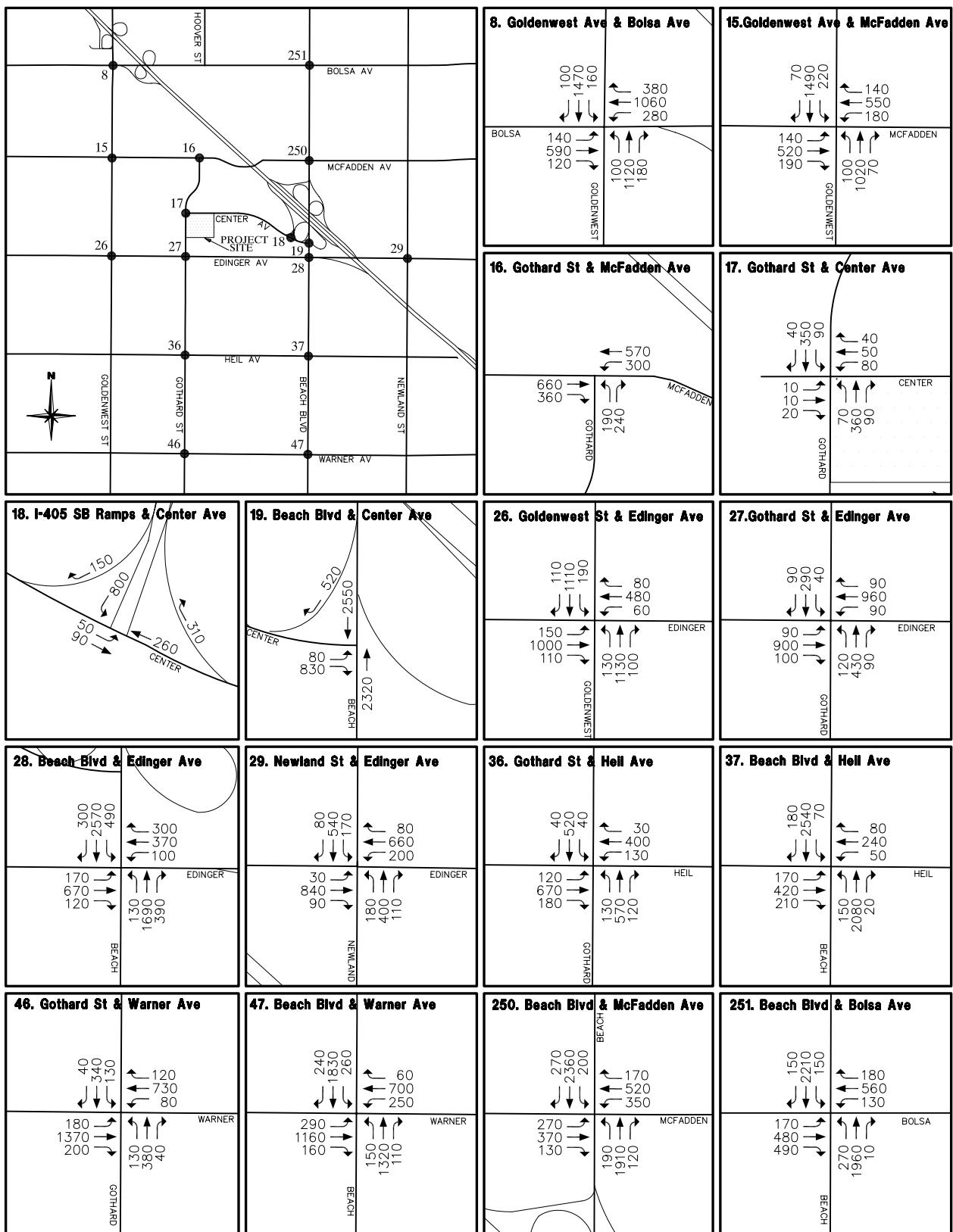


Figure 2-3

EXISTING AM PEAK HOUR VOLUMES

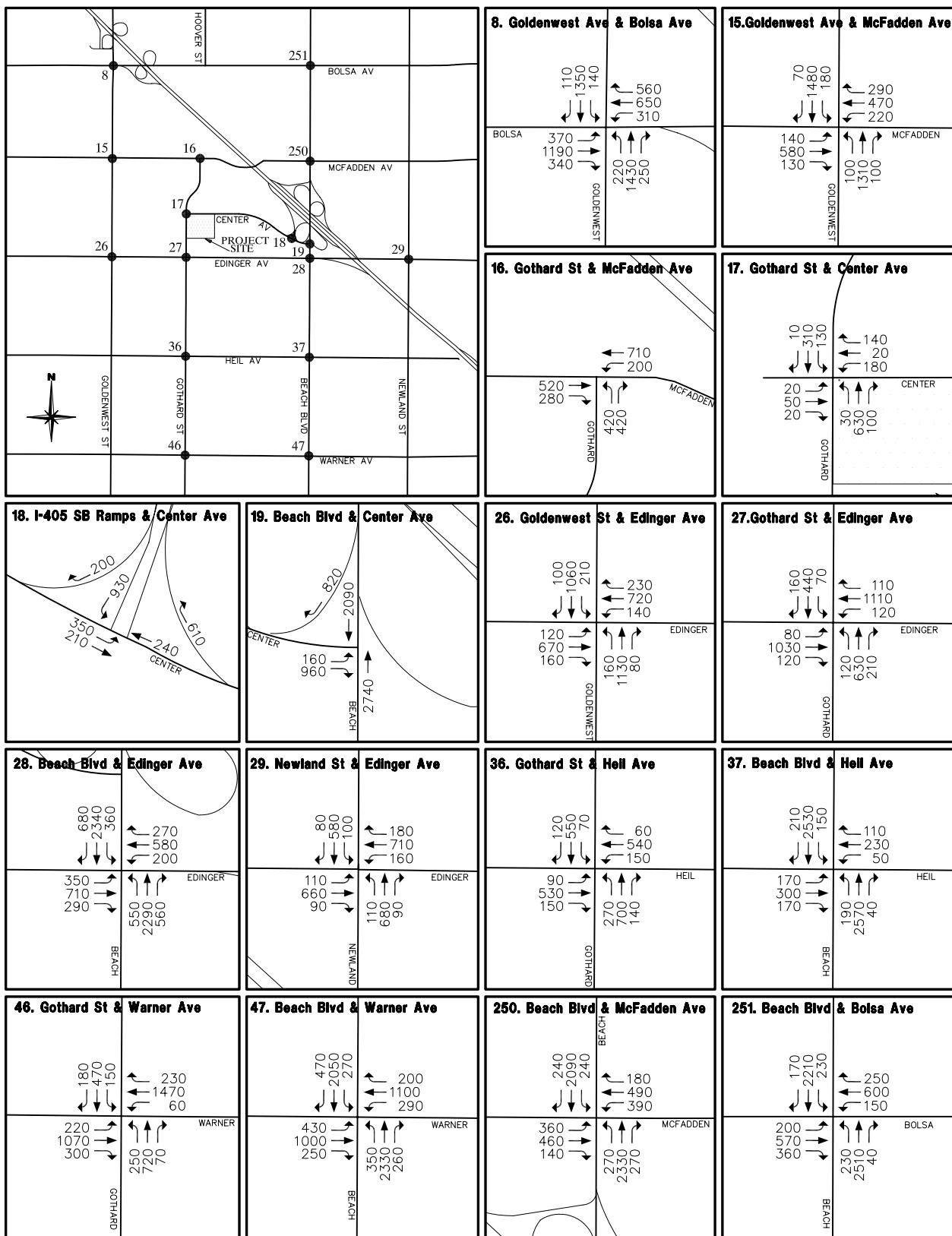


Figure 2-4

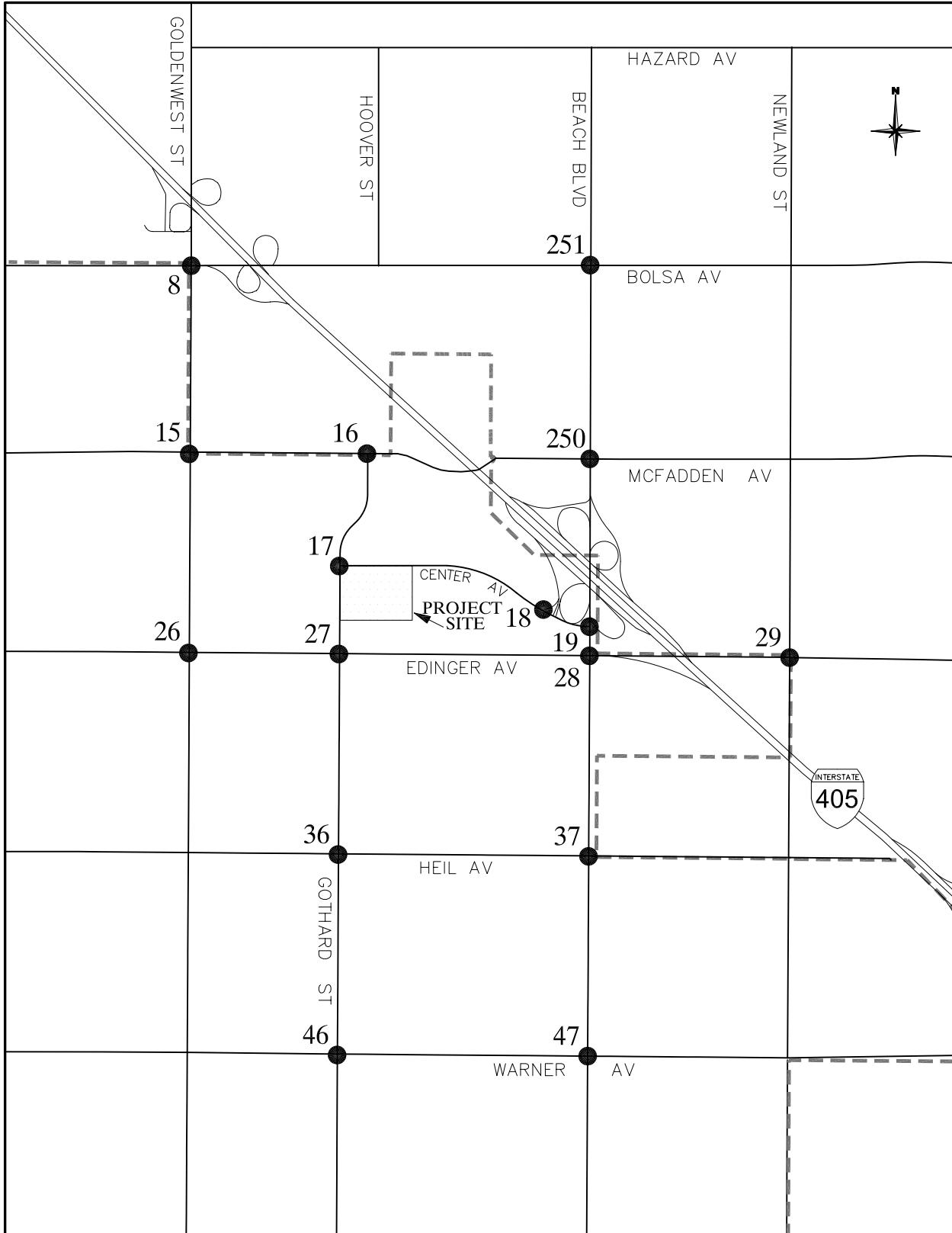
EXISTING PM PEAK HOUR VOLUMES

Table 2-1

## EXISTING LEVEL OF SERVICE SUMMARY

<b>Intersection Capacity Utilization (ICU)</b>				
<b>Location*</b>	<b>AM Peak Hour</b>		<b>PM Peak Hour</b>	
	<b>ICU</b>	<b>LOS</b>	<b>ICU</b>	<b>LOS</b>
8. Goldenwest St & Bolsa Ave	.64	B	.86	D
15. Goldenwest St & McFadden Ave	.68	B	.72	C
16. Gothard St & McFadden Ave	.48	A	.51	A
17. Gothard St & Center Ave	.28	A	.47	A
18. I-405 SB Ramps & Center Ave	.40	A	.75	C
19. Beach Blvd & Center Ave.	.67	B	.68	B
26. Goldenwest St & Edinger Ave	.62	B	.60	A
27. Gothard St & Edinger Ave	.47	A	.57	A
28. Beach Blvd & Edinger Ave	.71	C	.88	D
29. Newland St & Edinger Ave	.71	C	.62	B
36. Gothard St & Heil Ave	.56	A	.62	B
37. Beach Blvd & Heil Ave	.78	C	.80	C
46. Gothard St & Warner Ave	.56	A	.77	C
47. Beach Blvd & Warner Ave	.69	B	.89	D
250. Beach Blvd & McFadden Ave	.78	C	.81	D
251. Beach Blvd & Bolsa Ave	.81	D	.79	C
<b>Highway Capacity Manual (HCM) Delay (Caltrans Intersections)</b>				
<b>Location*</b>	<b>AM Peak Hour</b>		<b>PM Peak Hour</b>	
	<b>Delay</b>	<b>LOS</b>	<b>Delay</b>	<b>LOS</b>
18. I-405 SB Ramps & Center Ave	30.9	C	35.0	C
19. Beach Blvd & Center Ave	9.7	A	18.5	B
28. Beach Blvd & Edinger Ave	58.0	E	57.7	E
37. Beach Blvd & Heil Ave	22.3	C	15.9	B
47. Beach Blvd & Warner Ave	50.0	D	42.1	D
250. Beach Blvd & McFadden Ave	33.6	C	31.5	C
251. Beach Blvd & Bolsa Ave	38.7	D	32.3	C

\* See intersection locations in Figure 2-5



Legend



City Limits

Figure 2-5

INTERSECTION LOCATION MAP

Existing conditions on the freeway ramps that would be affected by the proposed project are summarized in Table 2-2. The I-405 northbound loop ramp from Beach Boulevard exceeds the LOS “E” threshold ( $V/C > 1.0$ ) in both the AM and PM peak hours.

## FUTURE CONDITIONS

The study area circulation system as defined by the Orange County Master Plan of Arterial Highways (MPAH) can be seen in Figure 2-6. Study area roadway segments not currently built to their full MPAH standard are as follows:

Roadway	Segment	MPAH	Existing
McFadden Ave	Goldenwest St to Beach Blvd	4-lane secondary arterial	2 lane roadway over I-405
Gothard St	Hoover St to McFadden Ave	4-lane secondary arterial	Not built
Heil Ave	Gothard St to Newland Ave	4-lane secondary arterial	2 lane roadway

Neither of the first two have current funding commitments for constructing to MPAH standards (widening in the case of McFadden Avenue and construction in the case of Gothard Street). Widening of Heil Avenue from Gothard Street to Beach Boulevard is part of the committed roadway system discussed below (widening of the section from Beach Boulevard to Newland Avenue is not yet committed).

The City’s General Plan Circulation Element has classifications for some roadways that differ from the MPAH. Of importance to this study is the classification of Gothard Street adjacent to the project, and a discussion of this can be found in Chapter 5.0.

For traffic analysis purposes, only currently committed roadway improvements have been assumed in the impact analysis. For the study area, these are as follows:

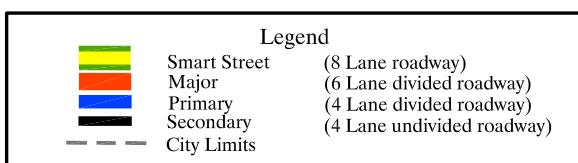
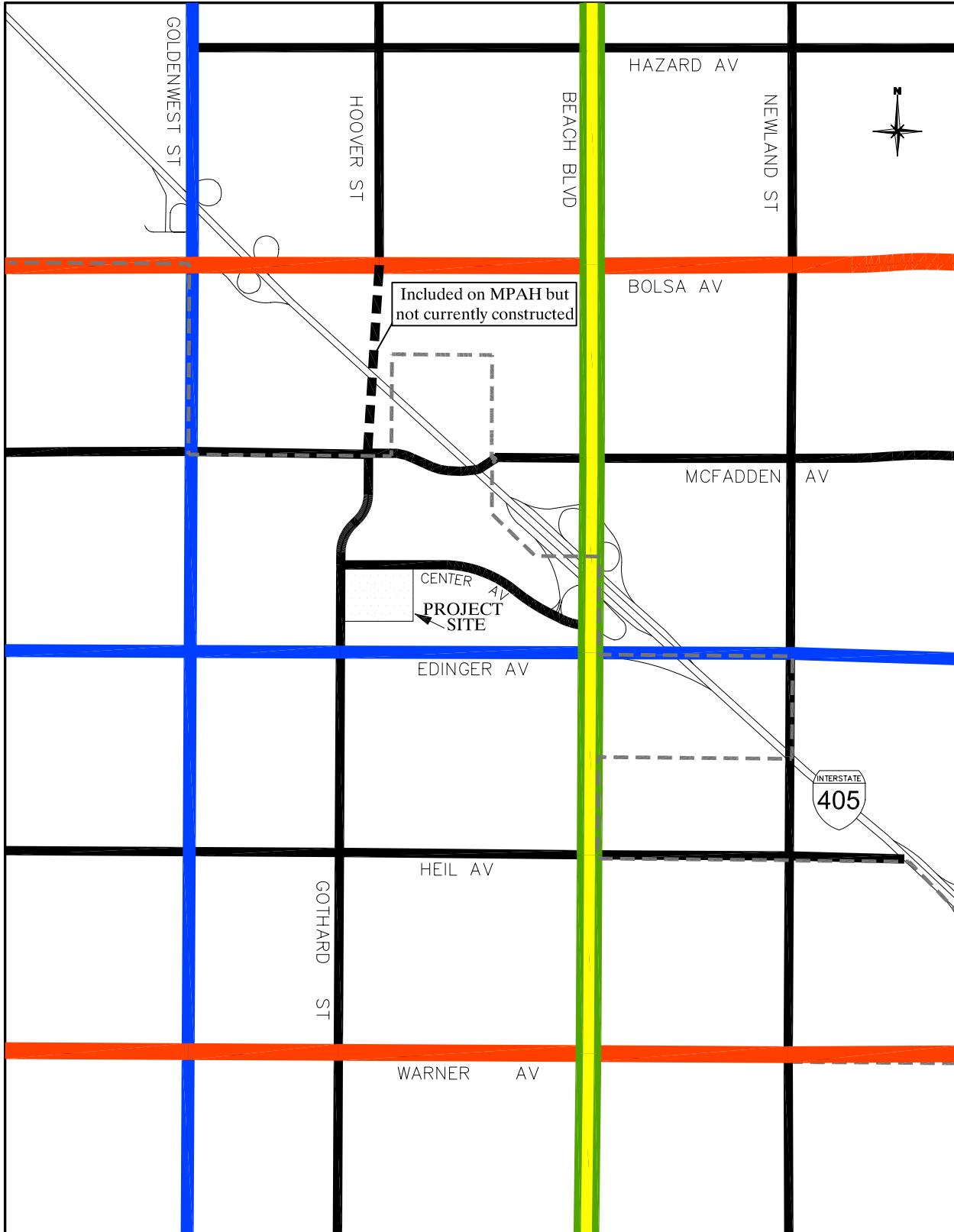
Location	Improvement	Time Frame
I-405 Freeway	Add one lane in each direction from I-605 to SR-73	Long-Range
Heil Ave	Widen to four lanes from Gothard St to Beach Blvd	Short-Range
Beach Blvd/Heil Ave	Convert westbound right turn lane to westbound through lane	Short-Range
Beach Blvd/Edinger Ave	Add second westbound left turn lane	Short-Range

The intersection improvements (last two items in this table) are assumed in both the short-range and long-range analyses.

Table 2-2

## EXISTING FREEWAY RAMP V/C SUMMARY

<b>Location</b>	<b>AM Peak Hour</b>			<b>PM Peak Hour</b>		
	<b>Capacity</b>	<b>Volume</b>	<b>V/C</b>	<b>Capacity</b>	<b>Volume</b>	<b>V/C</b>
I-405/Beach Blvd NB loop on-ramp (from NB Beach Blvd)	900	1240	1.38	900	1,510	1.68
I-405/Beach Blvd NB loop off-ramp (to SB Beach Blvd)	1,200	690	.58	1,200	880	.73
I-405/Beach Blvd SB on-ramp at Center Ave	1,800	360	.20	1,800	960	.53
I-405/Beach Blvd SB off-ramp at Center Ave	1,500	950	.63	1,500	1,130	.75
I-405/Edinger Ave SB direct on-ramp	1,080	570	.53	1,080	570	.53



**Figure 2-6**  
**CURRENT MPAH**

It should be noted that the City also uses an adopted Precise Plan of Street Alignment for establishing street dimensions in cases where right-of-way dedication is required.

## FUTURE GROWTH

Future growth in the City of Huntington Beach is portrayed in the Orange County Projections (OCP) 2006 and also in the citywide land use database recently prepared by the City. The latter is the basis for long-range traffic forecasting and the citywide growth statistics are as follows:

Category	2007	2030	Increase
Population	216,471	233,457	8%
Housing	76,890	83,396	8%
Employment	81,694	94,127	15%

These forecasts are similar to those in OCP-2006, and as can be seen they show an eight percent increase in population and housing and a 15 percent increase in employment by 2030 in Huntington Beach.

Long-range (2030) volumes used in this analysis are derived using the Huntington Beach Traffic Model (HBTM) as discussed in Chapter 1.0. The HBTM uses the land use projections listed above to forecast future traffic volumes on the citywide arterial street system.

For the short-range (2014) analysis, background (no-project) traffic volumes were derived by interpolating between existing and 2030 volumes. They generally represent a 2014 time frame and account for ambient growth and related projects during this time period. The 2014 analysis also provides the five to seven year time frame required for Growth Management Plan (GMP) and Congestion Management Program (CMP) purposes.

# Chapter 3.0

## PROJECT DESCRIPTION

This chapter describes the proposed project in terms of its traffic-related characteristics. The project trip generation and trip distribution are estimated and project-generated traffic volumes on the study area circulation system are presented.

### PROJECT DESCRIPTION

The Ripcurl is a proposed mixed use development in the northeast part of the City of Huntington Beach. The site is located adjacent to and southeast of the Gothard Street/Center Avenue intersection with access from Gothard Street and Center Avenue (see project site with access locations in Figure 3-1). The Center Avenue access will serve the residential parking garage and the Gothard Street access will serve the retail. Because of its proximity to the Center Avenue intersection (130 feet), the Gothard Street access will be right-in/right-out only.

Proposed land uses on the site include 440 residential rental units and 10,000 square feet of retail uses. The project will replace an existing commercial establishment known as the College Country Center, which has 60,000 square feet of retail and office uses. The General Plan Amendment (GPA) being processed for the project will change the existing General Commercial designation to allow mixed-use on the site.

The project will be within walking distance of the Bella Terra regional shopping center and the Golden West Community College (the retail uses in the project will target patronage from the college). The Golden West Transportation Center is immediately to the north of the project site.

### TRIP GENERATION

Basic trip generation rates for the project land uses were taken from the Institute of Transportation Engineers' (ITE) "Trip Generation" manual and then adjusted for "local capture" trips (walk trips to and from adjacent areas). The local trip capture is based on trip purpose and uses standard

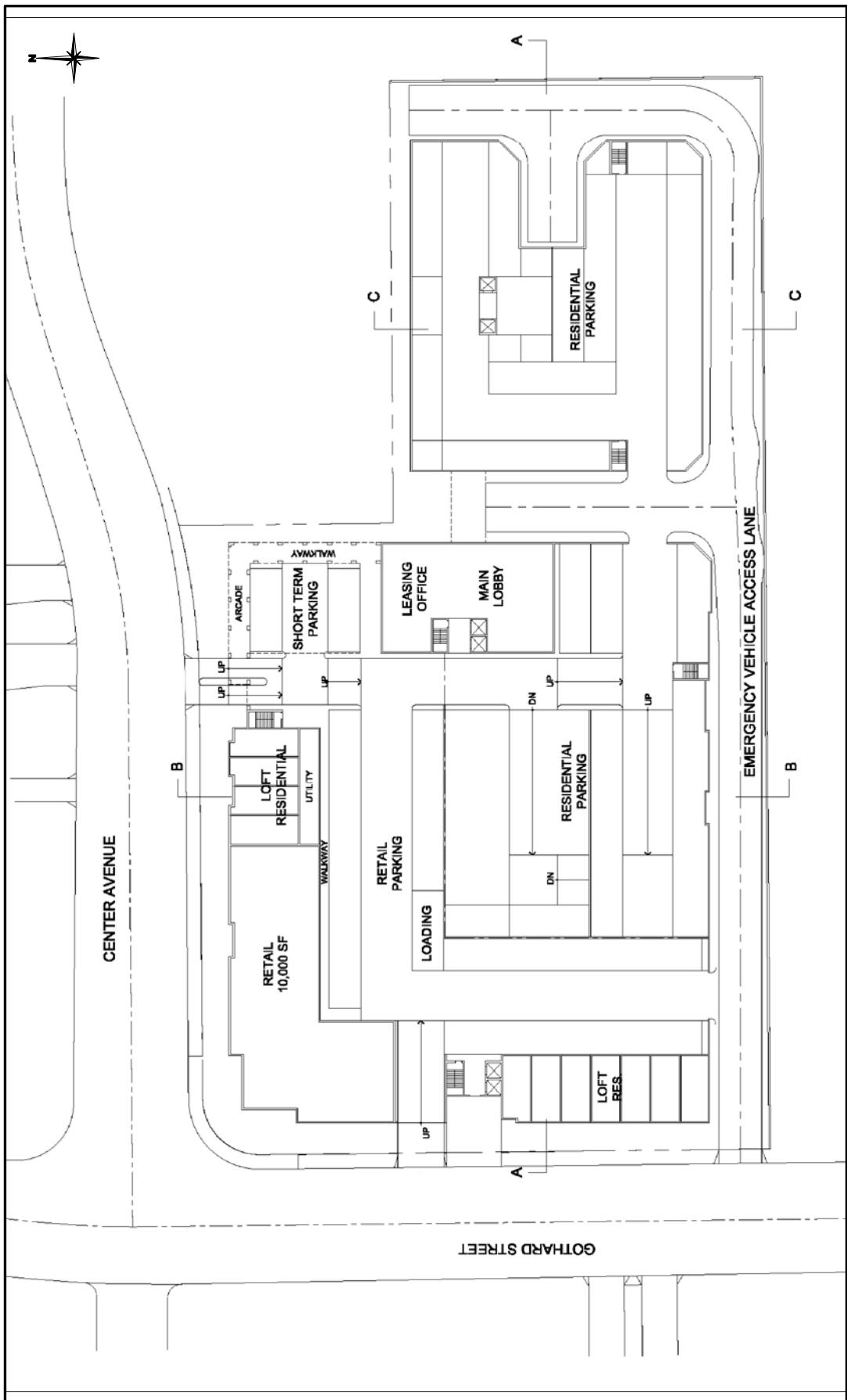


Figure 3-1

PROJECT SITE PLAN

traffic modeling relationships to categorize the residential trips by purpose and then apply local capture proportions to each trip purpose. The calculations are as follows:

RESIDENTIAL INTERNAL/LOCAL TRIP CAPTURE							
Trip Purpose	AM Peak Hour Percent	PM Peak Hour Percent	ADT Percent	Capture Rate	AM Capture	PM Capture	ADT Capture
Home-Based Work & School	70%	57%	44%	10%	7.0%	5.7%	4.4%
Home-Based Shopping	2%	11%	13%	50%	1.0%	5.5%	6.5%
Home-Based Social/Recreation	6%	12%	15%	40%	2.4%	4.8%	6.0%
Home-Based Other	22%	20%	28%	5%	1.1%	1.0%	1.4%
<b>Total</b>	100%	100%	100%	--	11.5%	17.0%	18.3%

The percentages by trip purpose are taken from the Huntington Beach Traffic Model (HBTM), and the capture rates are estimated as realistic interactions with a center the size of Bella Terra and with the surrounding commercial and educational uses. The combined internal and local capture was also verified by examining trip interactions with the immediate area as estimated by the traffic model.

For the retail component of the project, local trip capture (i.e., non-vehicular trips) will also occur, particularly from the adjacent college. For analysis purposes, it has been assumed that 50 percent of these trips will be local capture or pass-by and therefore not part of the project vehicle trip generation.

The project trip generation results are summarized in Table 3-1. As can be seen, the proposed project will generate 1,666 new daily trips, of which 141 will be in the AM peak hour and 144 in the PM peak hour. Because of the peak hour directionality differences between the existing office use and the new residential land use, the AM peak hour inbound volume actually shows a reduction compared to existing AM inbound trips generated by the site.

## TRIP DISTRIBUTION

The geographic distribution of trips in the study area to and from the project was estimated using regional distribution patterns derived from the HBTM. The resulting project trip distribution pattern is illustrated in Figure 3-2. It is based on the distribution of daily trips generated by the project as assigned to the study area street system. The percentages illustrated here are representative of the ADT volumes,

Table 3-1

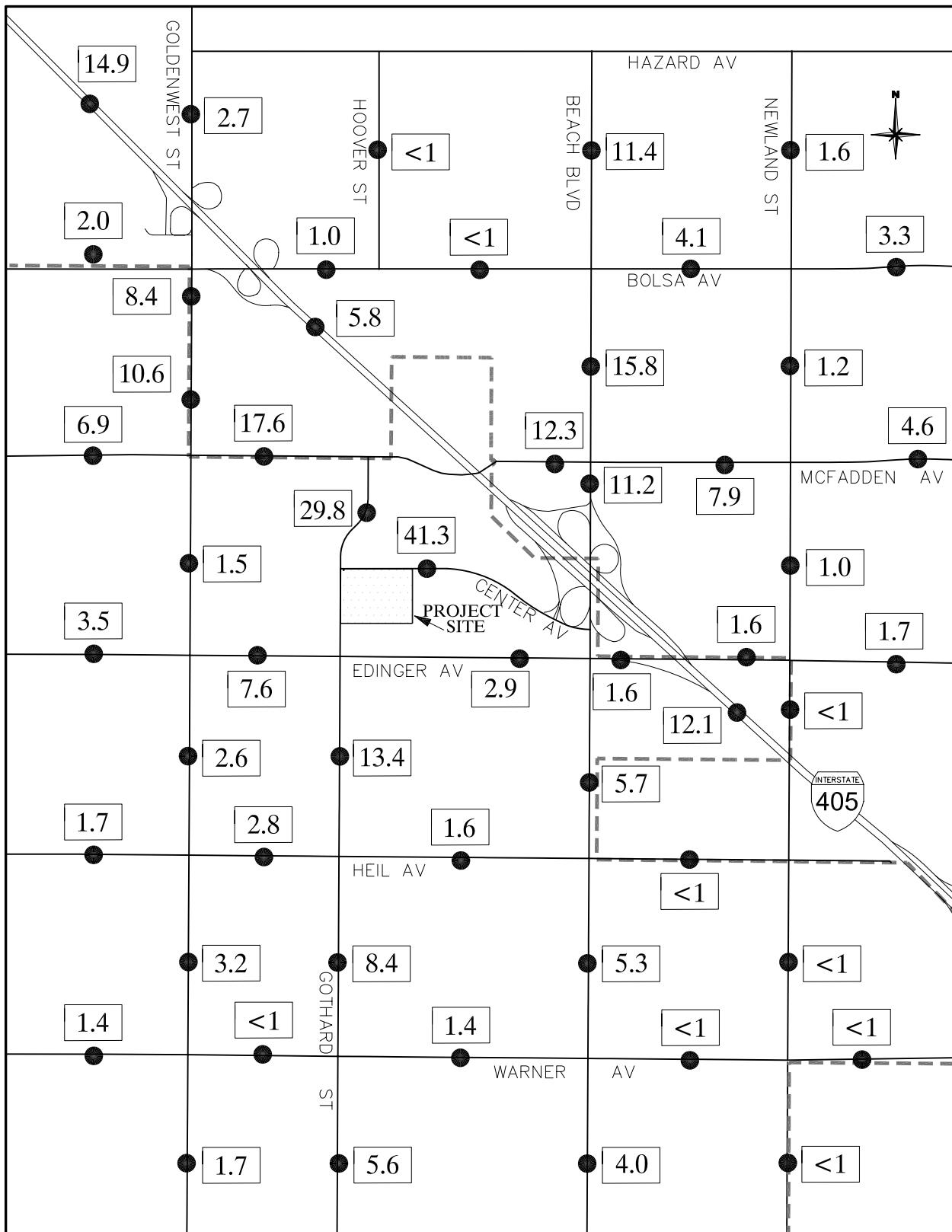
## THE RIPCURL TRIP GENERATION SUMMARY

<b>Project Description</b>	<b>Amount</b>	<b>AM Peak Hour</b>			<b>PM Peak Hour</b>			<b>ADT</b>
		<b>In</b>	<b>Out</b>	<b>Total</b>	<b>In</b>	<b>Out</b>	<b>Total</b>	
The Ripcurl Commercial <sup>1</sup>	10,000 SF	3	2	5	9	10	19	215
The Ripcurl Residential <sup>2</sup>	440 DU	39	160	199	146	81	227	2,425
<b>Total Project</b>		<b>42</b>	<b>162</b>	<b>204</b>	<b>155</b>	<b>91</b>	<b>246</b>	<b>2,640</b>
Existing Commercial <sup>1</sup>	30,000 SF	10	6	16	27	30	57	644
Existing Office	30,000 SF	41	6	47	8	37	45	330
<b>Net Trip Generation Increase</b>		<b>(9)</b>	<b>150</b>	<b>141</b>	<b>120</b>	<b>24</b>	<b>144</b>	<b>1,666</b>

Abbreviations: ADT – average daily traffic  
DU – dwelling unit  
SF – square feet

<sup>1</sup> Trips based on ITE (7th Ed.) General Commercial (820) rates with 50 percent reduction for local capture.

<sup>2</sup> Trips based on ITE (7th Ed.) Apartment (220) rates with local capture of 11 percent for the AM peak hour, 17 percent for PM peak hour and 18 percent for ADT.



Legend

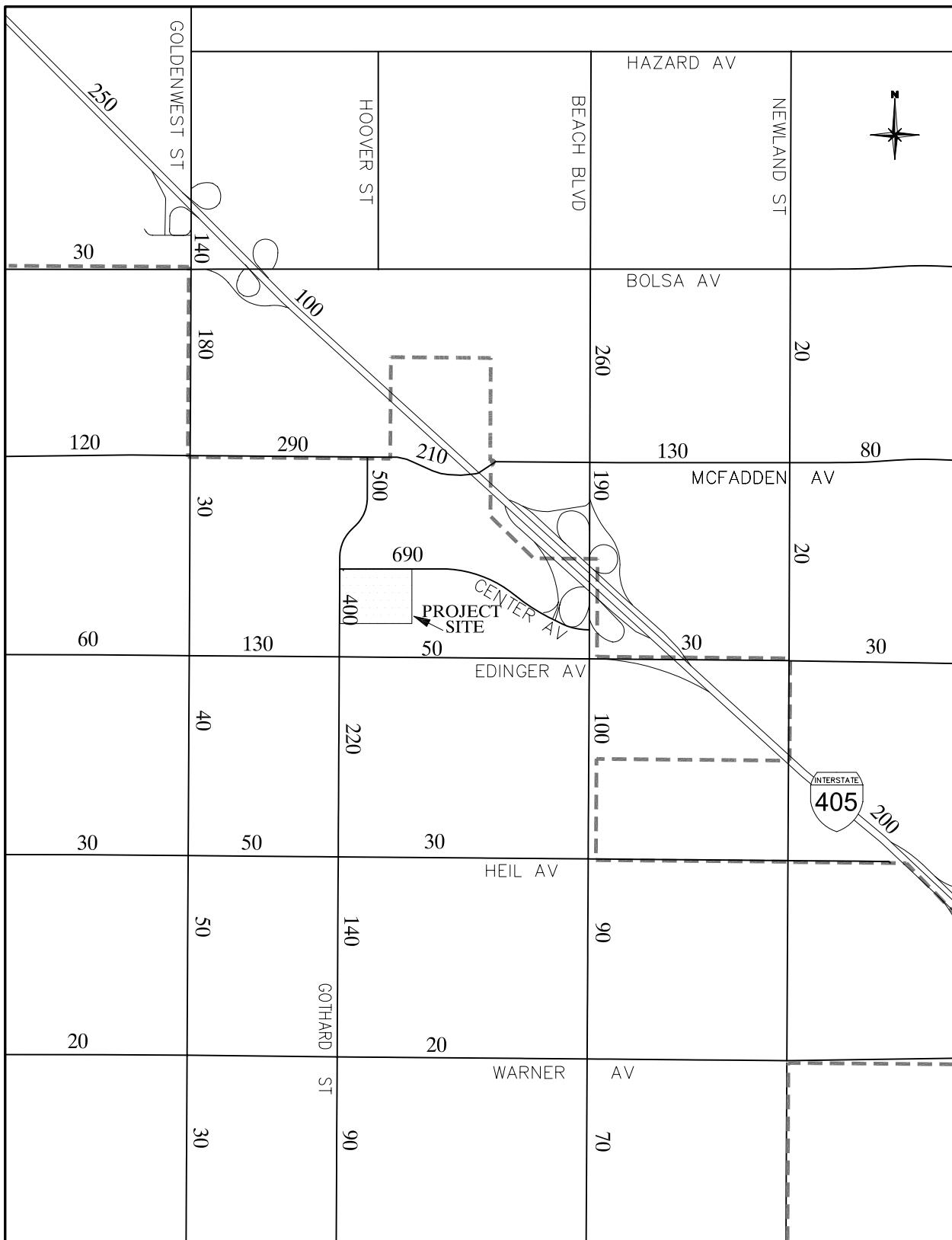
= City Limits  
 = Distribution %

Figure 3-2

#### PROJECT TRIP DISTRIBUTION

and the directional distribution used for calculating peak hour project trips differ slightly on certain links compared to the ADT distribution (see Appendix C for details).

Project ADT trips on the study area circulation system are illustrated in Figure 3-3 and the project peak hour trips at the study area intersections are shown for AM and PM peak hour conditions in Figures 3-4 and 3-5, respectively. These project traffic volumes are used in the next chapter to identify short-range and long-range project impacts. As shown there, the project has a mitigation measure at the I-405 southbound ramp intersection with Center Avenue, and is also required to dedicate five feet of frontage on Gothard Street.



Legend

XX Project ADT

Figure 3-3

ADT VOLUMES  
- PROJECT-ONLY

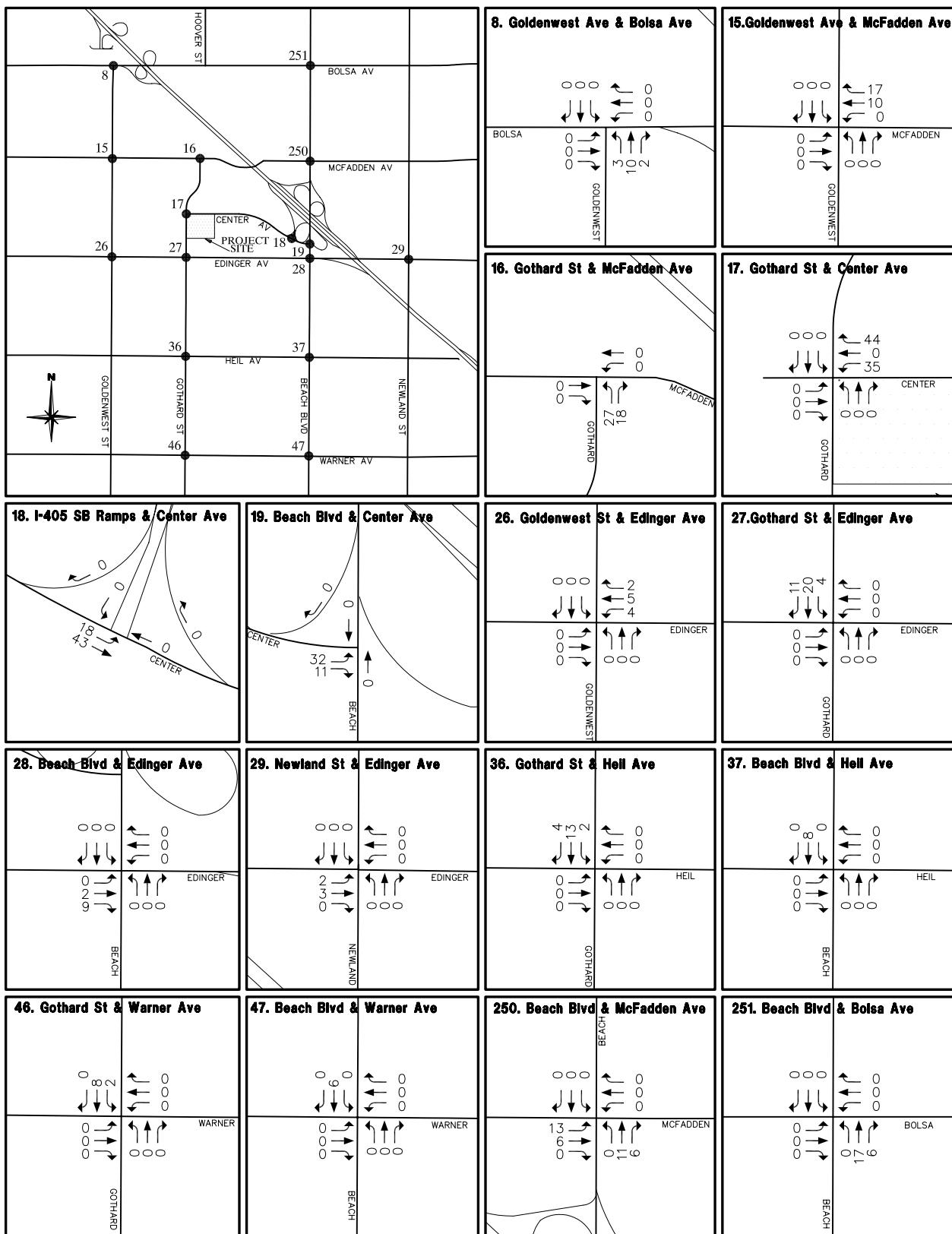


Figure 3-4

AM PEAK HOUR VOLUMES  
- PROJECT-ONLY

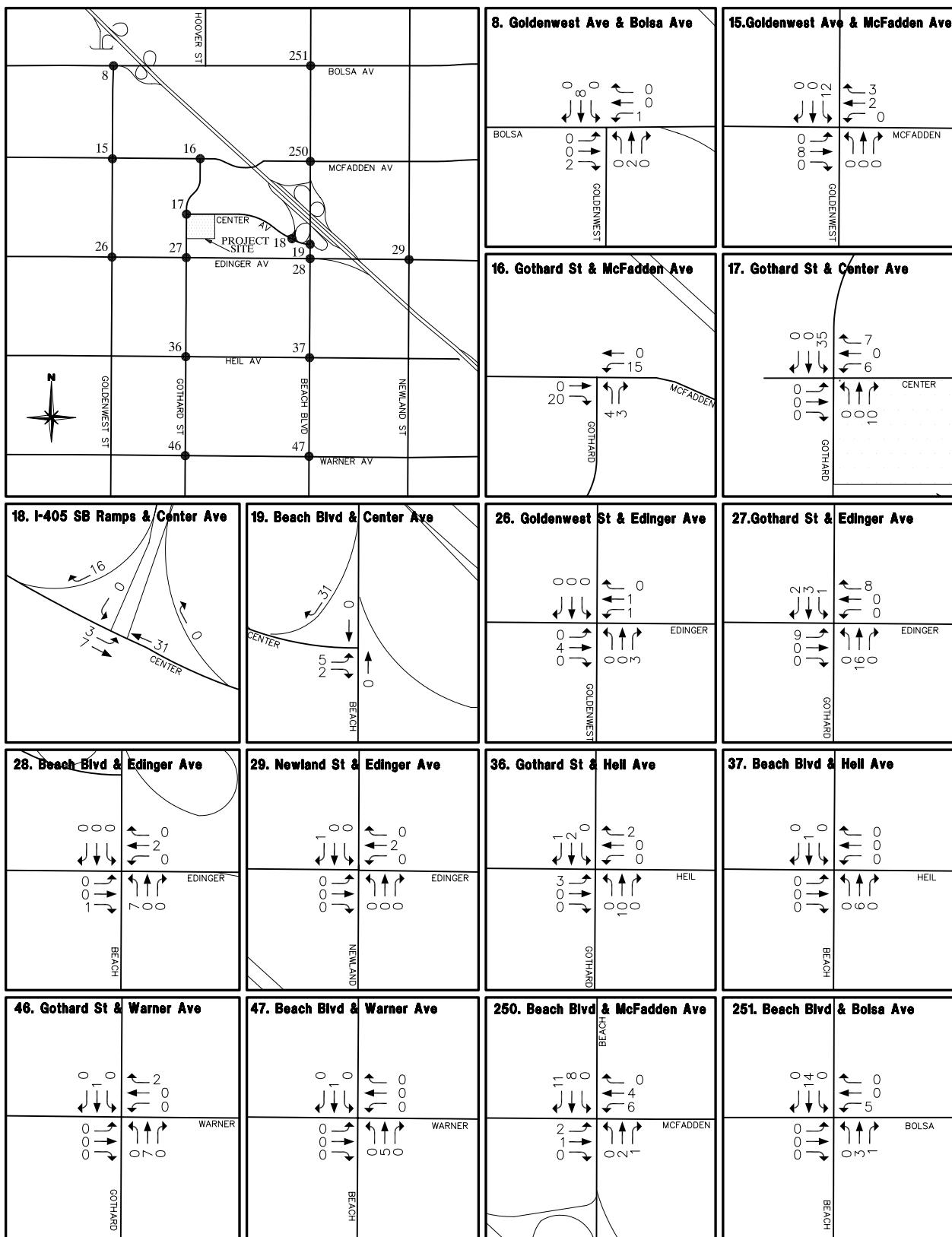


Figure 3-5

PM PEAK HOUR VOLUMES  
- PROJECT-ONLY

# Chapter 4.0

## IMPACT ANALYSIS

This chapter discusses the traffic impacts of the project. Both short-range and long-range results are presented using the methodologies and performance criteria described in Chapter 1.0.

### SHORT-RANGE ANALYSIS

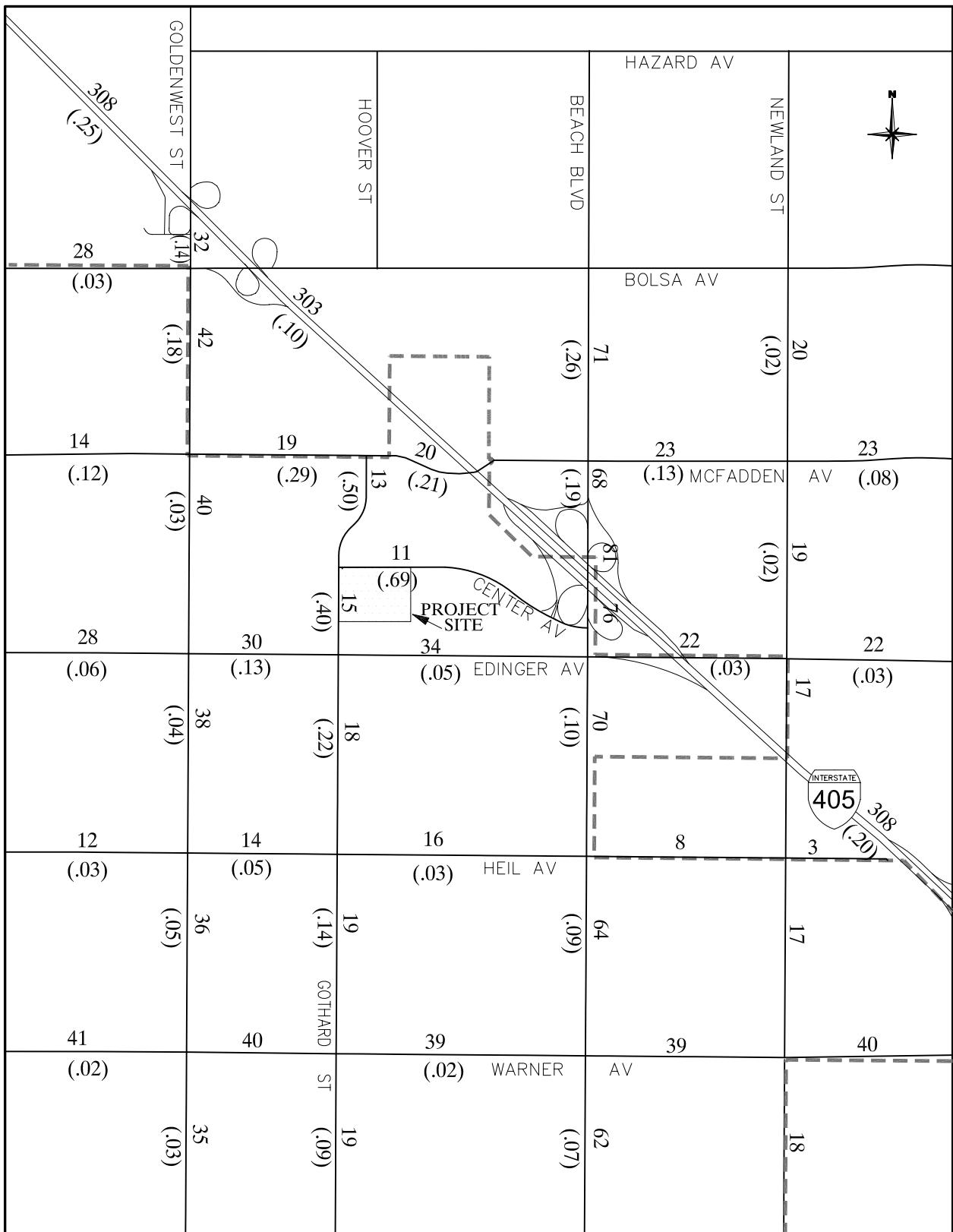
Average daily traffic (ADT) volumes for 2014 are illustrated in Figure 4-1. These are with-project volumes, and the project contribution to individual links in the study area are included in the illustration.

The no-project AM and PM peak hour intersection volumes are presented in Figures 4-2 and 4-3, respectively. To identify potential project impacts, the project-only peak hour intersection volumes presented in Chapter 3.0 were added to these no-project background volumes. The resulting AM and PM peak hour intersection volumes are presented in Figures 4-4 and 4-5, respectively.

A summary of 2014 with and without project intersection capacity utilization (ICU) values is given in Table 4-1 (actual ICU calculations can be found in Appendix A). A discussion of the traffic operations findings for Caltrans intersections can be found later in this chapter.

For the intersections at LOS “E”, a determination was made as to whether the project contribution amounted to one percent or more in accordance with the performance criteria for significant project impacts. This was carried out by summing the project traffic ICU contribution to each critical movement in the ICU calculation, and the results are as follows:

Location	AM/PM	PROJECT ICU
8. Goldenwest & Bolsa	PM	0.07%
28. Beach & Edinger	AM	0.00%
28. Beach & Edinger	PM	0.04%
47. Beach & Warner	PM	0.07%



Legend  
 $\frac{XX}{(Y.Y)}$  ADT (000s)  
 Project Contribution (000s)  
 Less than .01 not shown

Figure 4-1  
 STUDY AREA ADT VOLUMES (000s)  
 - YEAR 2014 WITH-PROJECT

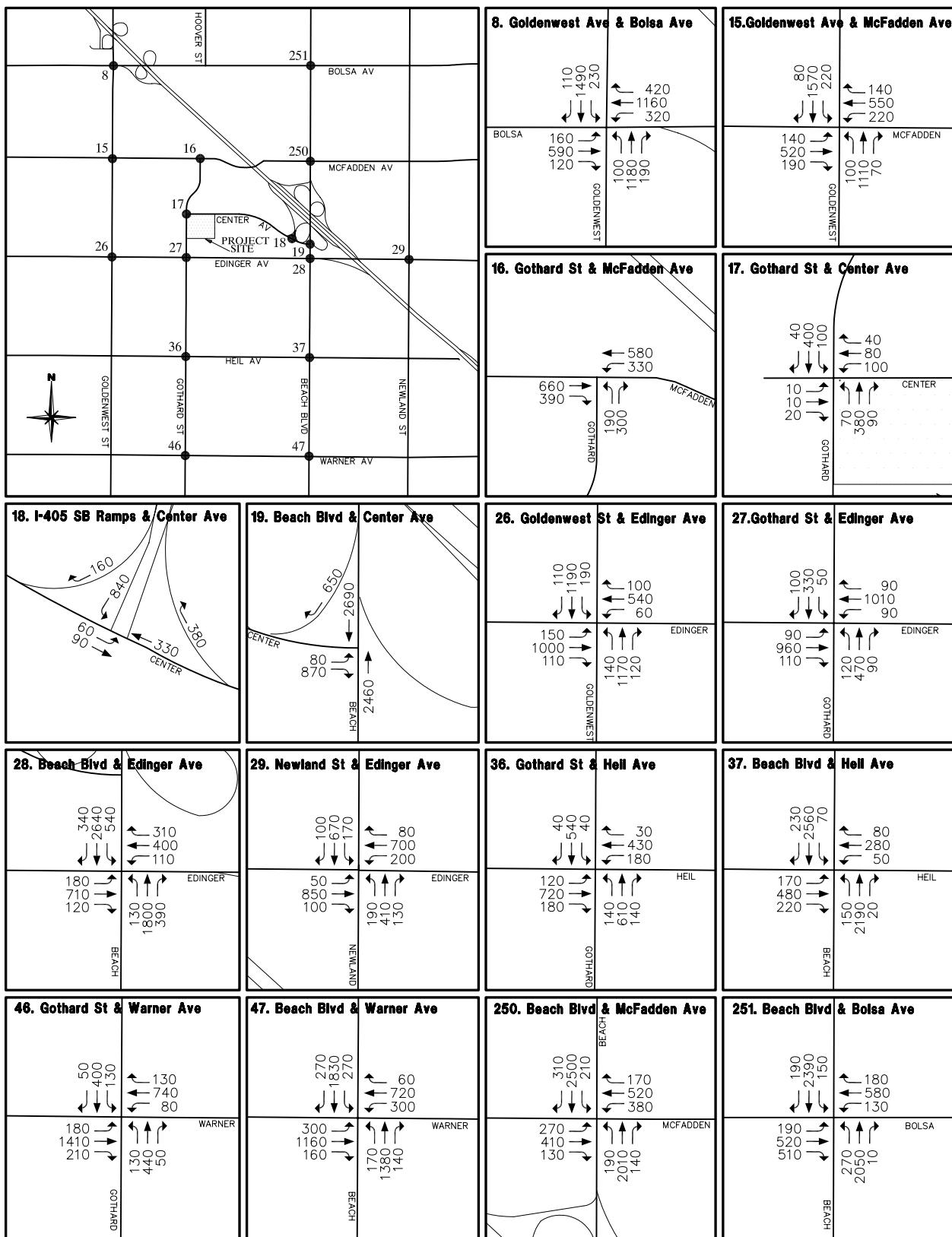


Figure 4-2

YEAR 2014 AM PEAK HOUR VOLUMES  
- NO-PROJECT

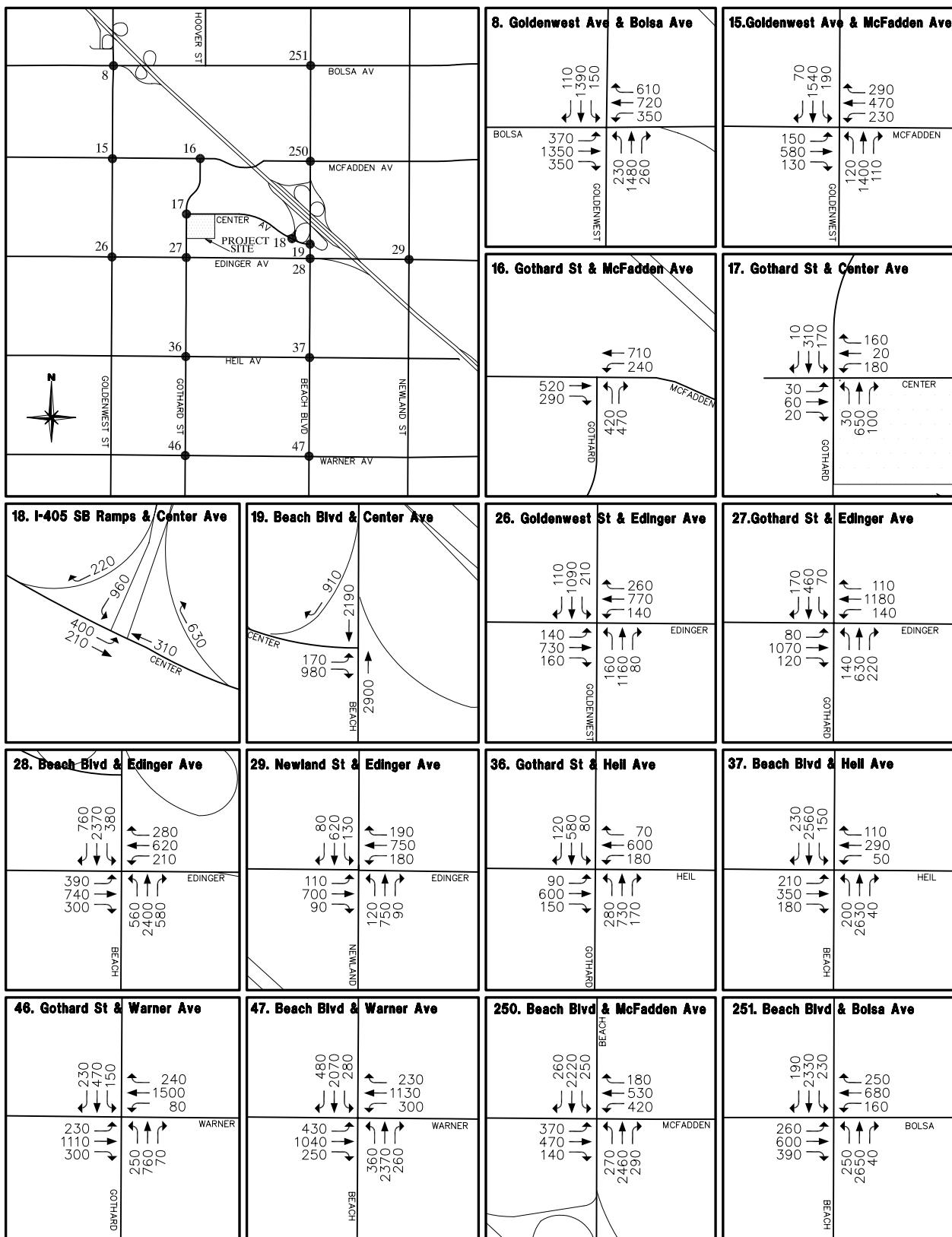


Figure 4-3

YEAR 2014 PM PEAK HOUR VOLUMES  
- NO-PROJECT

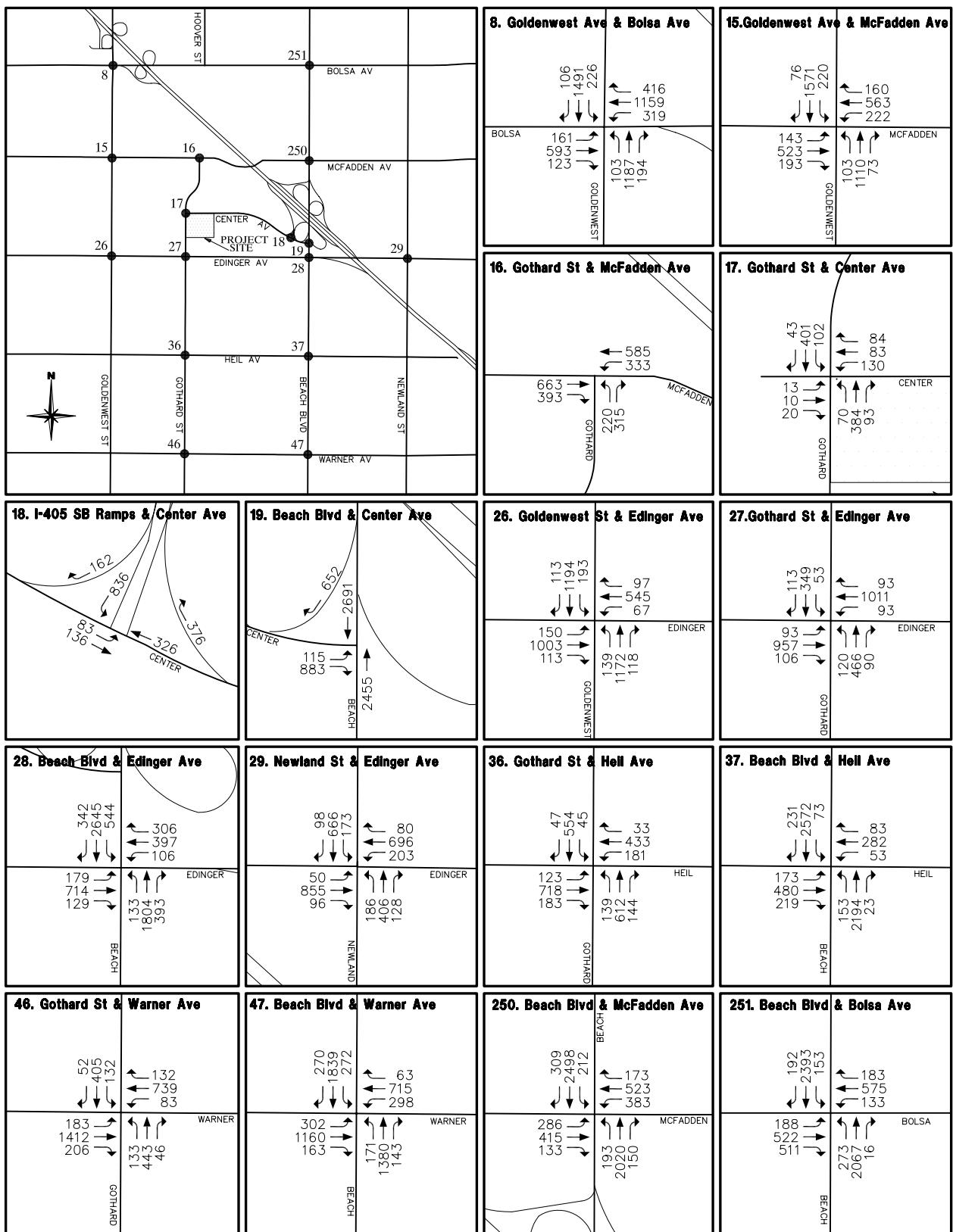


Figure 4-4

YEAR 2014 AM PEAK HOUR VOLUMES  
- WITH-PROJECT

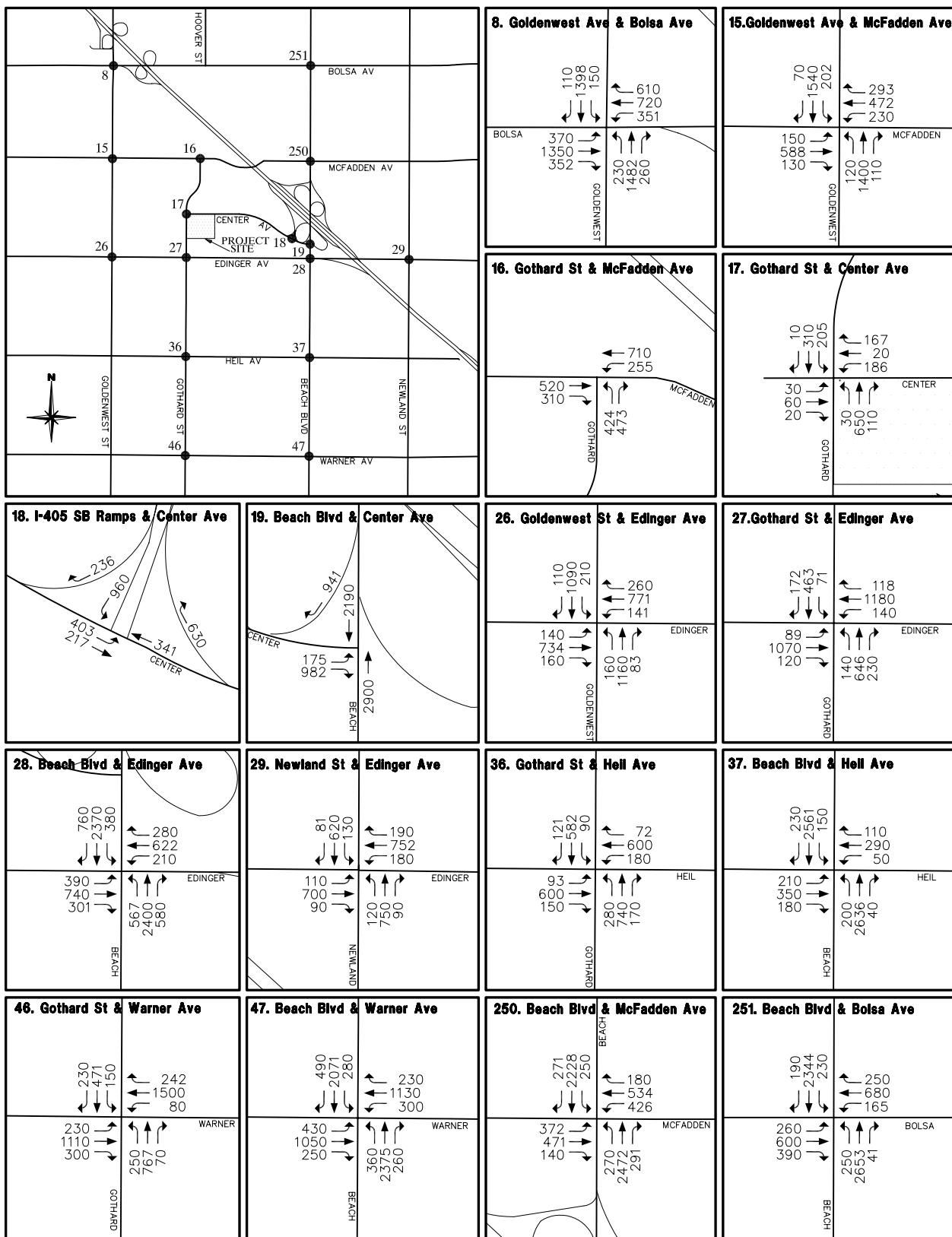


Figure 4-5

YEAR 2014 PM PEAK HOUR VOLUMES  
- WITH-PROJECT

Table 4-1

## 2014 ICU SUMMARY

Intersection	No-Project				With-Project			
	AM		PM		AM		PM	
	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS
8. Goldenwest Ave & Bolsa Ave	.74	C	.91	E	.74	C	.91	E
15. Goldenwest Ave & McFadden Ave	.71	C	.75	C	.71	C	.75	C
16. Gothard St & McFadden Ave	.52	A	.55	A	.53	A	.55	A
17. Gothard St & Center Ave	.30	A	.50	A	.32	A	.52	A
18. I-405 SB Ramps & Center Ave	.44	A	.80	C	.45	A	.80	C
19. Beach Blvd & Center Ave	.71	C	.71	C	.71	C	.71	C
26. Goldenwest St & Edinger Ave	.63	B	.63	B	.63	B	.63	B
27. Gothard St & Edinger Ave	.49	A	.58	A	.49	A	.58	A
28. Beach Blvd & Edinger Ave	.76	C	.92	E	.76	C	.92	E
29. Newland St & Edinger Ave	.76	C	.70	B	.76	C	.70	B
36. Gothard St & Heil Ave	.61	B	.67	B	.61	B	.67	B
37. Beach Blvd & Heil Ave	.76	D	.82	D	.76	D	.82	D
46. Gothard St & Warner Ave	.59	A	.79	C	.59	A	.80	C
47. Beach Blvd & Warner Ave	.72	C	.92	E	.72	C	.92	E
250. Beach Blvd & McFadden Ave	.80	C	.85	D	.80	C	.85	D
251. Beach Blvd & Bolsa Ave	.85	D	.87	D	.85	D	.87	D

Level of service ranges: .00 - .60 A  
 .61 - .70 B  
 .71 - .80 C  
 .81 - .90 D  
 .91 – 1.00 E  
 Above 1.00 F

Hence, the project does not impact any of these locations.

## LONG-RANGE ANALYSIS

The 2030 with-project ADT volumes can be seen in Figure 4-6 together with the project contribution on each roadway segment. No-project AM and PM peak hour intersection volumes are illustrated in Figures 4-7 and 4-8, respectively. These represent long-range volumes under buildup of the City's General Plan and regional growth projections from OCTA. For the project site, the existing land uses are assumed since they represent existing General Plan zoning.

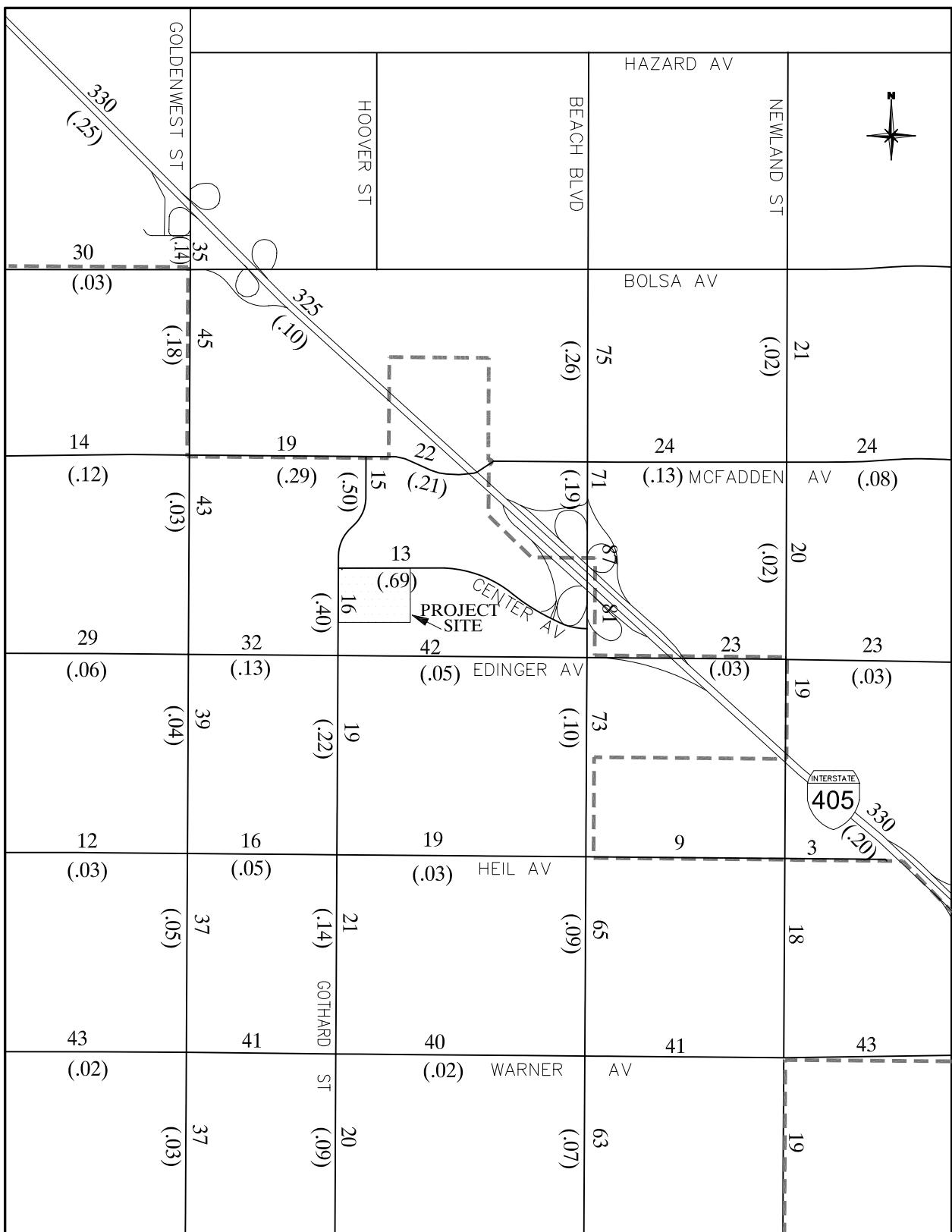
With-project AM and PM peak hour intersection volumes are shown in Figures 4-9 and 4-10, respectively. These were derived by adding the project-only volumes to the background (no-project) volumes presented above. As described in Chapter 3.0, the project volumes thereby reflect the trip differences between the existing General Plan and the proposed GPA.

A summary of the 2030 ICU values can be found in Table 4-2 (see Appendix A for actual ICU calculations). Seven intersections show long-range deficiencies (ICU greater than 0.90). For the intersections at LOS "E" or worse, a determination was made as to whether the project contribution amounted to one percent or more. This was carried out by summing the project traffic ICU contribution to each critical movement in the ICU calculation, and the results are as follows:

Location	AM/PM	PROJECT ICU
8. Goldenwest & Bolsa	PM	0.07%
18. I-405 Ramps & Center	PM	1.09%
28. Beach & Edinger	AM	0.00%
28. Beach & Edinger	PM	0.04%
37. Beach & Heil	AM	0.12%
37. Beach & Heil	PM	0.01%
47. Beach & Warner	PM	0.07%
250. Beach & McFadden	AM	0.18%
250. Beach & McFadden	PM	0.21%
251. Beach & Bolsa	AM	0.00%
251. Beach & Bolsa	PM	0.04%

Hence, the project has an impact at the intersection of the I-405 ramps and Center Avenue.

Measures to address this project impact are discussed later in this chapter.



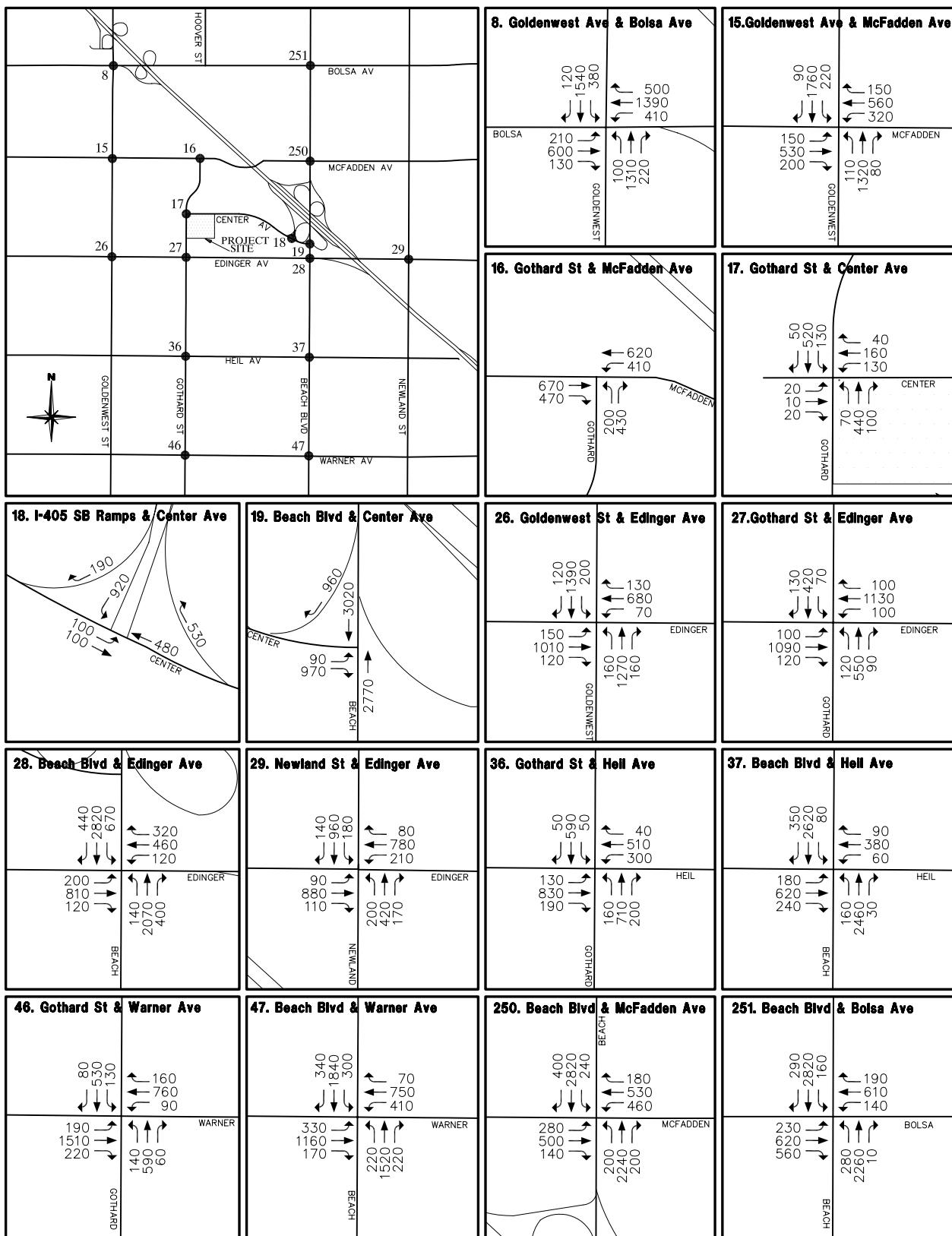


Figure 4-7  
YEAR 2030 AM PEAK HOUR VOLUMES  
- NO-PROJECT

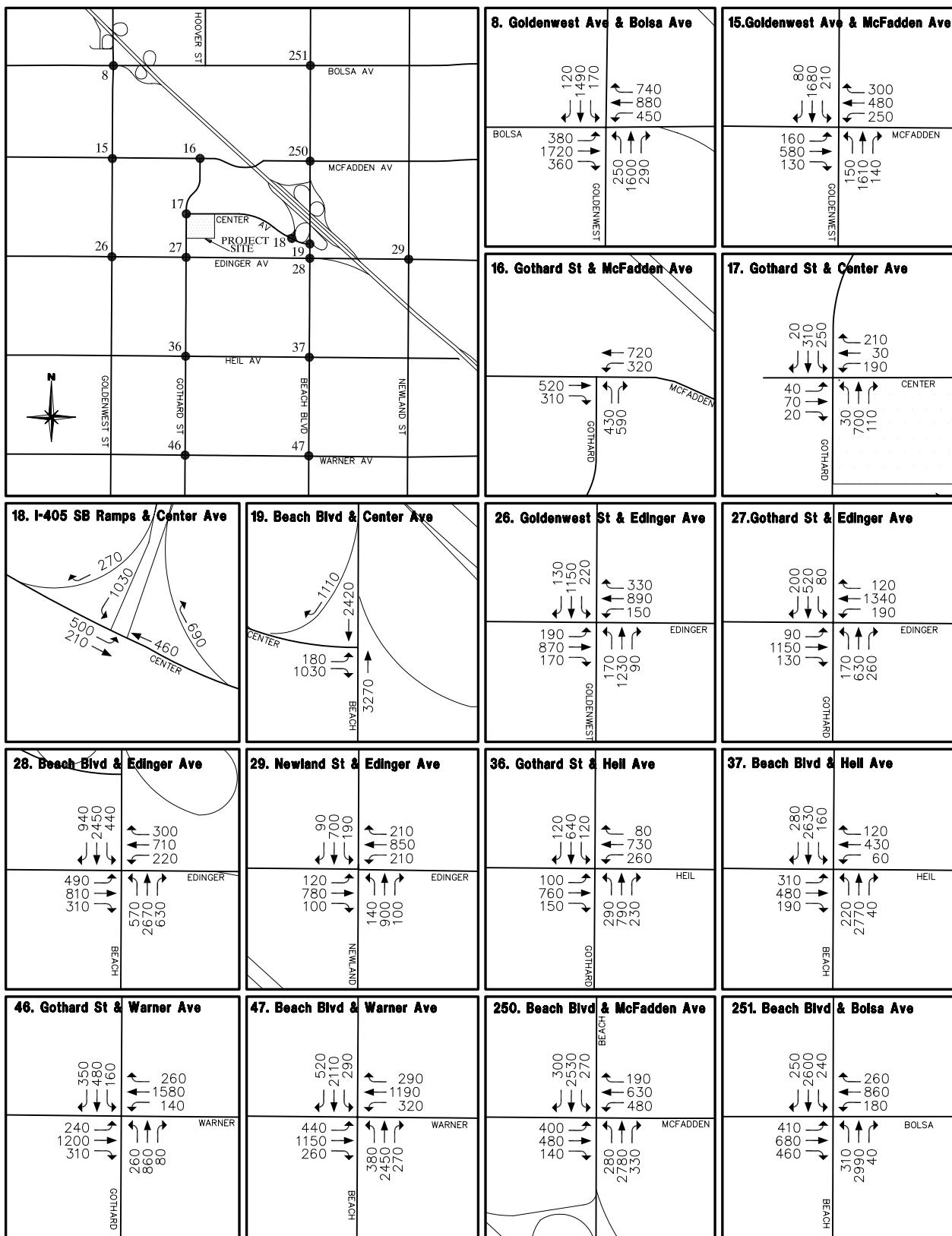


Figure 4-8

YEAR 2030 PM PEAK HOUR VOLUMES  
- NO-PROJECT

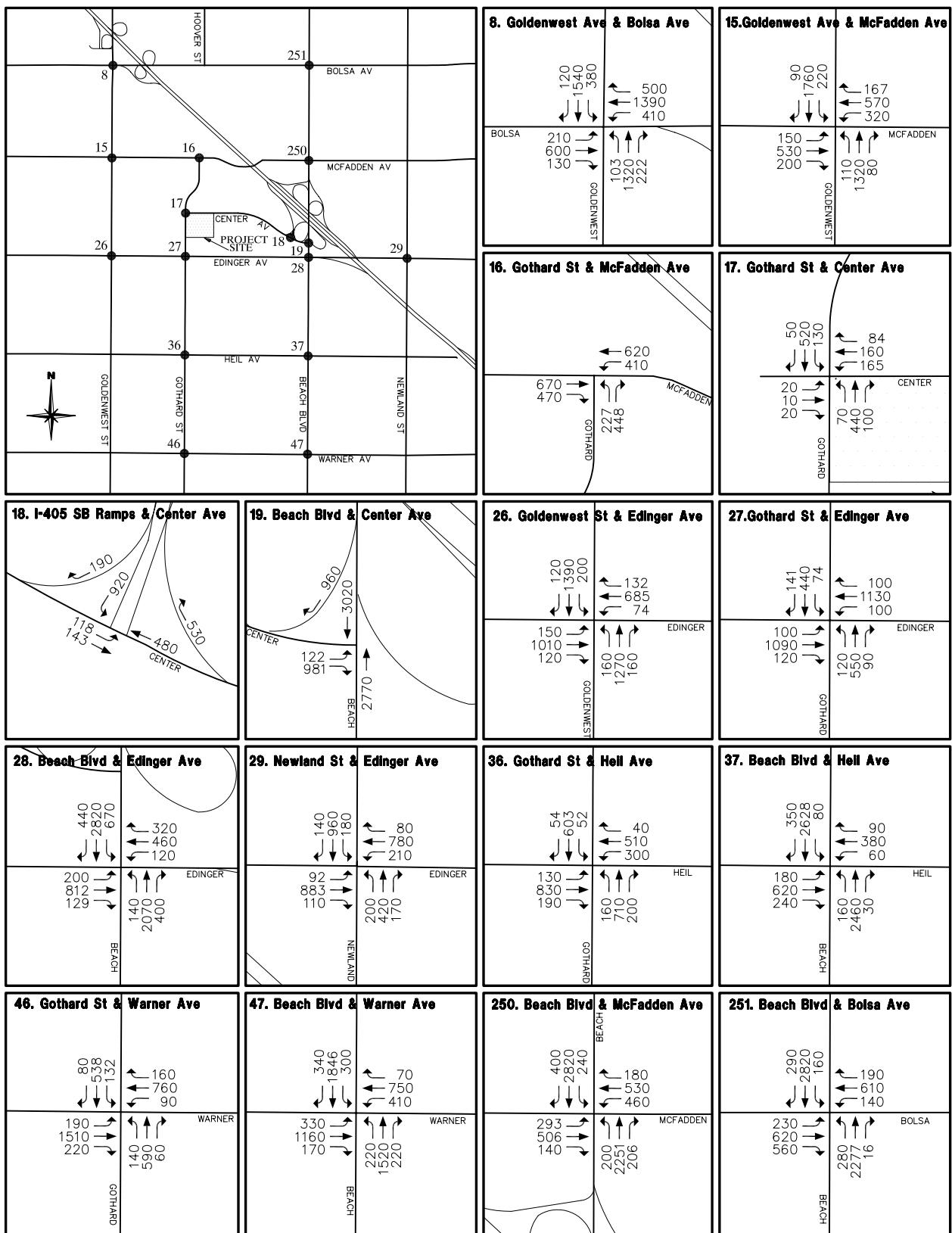


Figure 4-9

YEAR 2030 AM PEAK HOUR VOLUMES  
- WITH-PROJECT

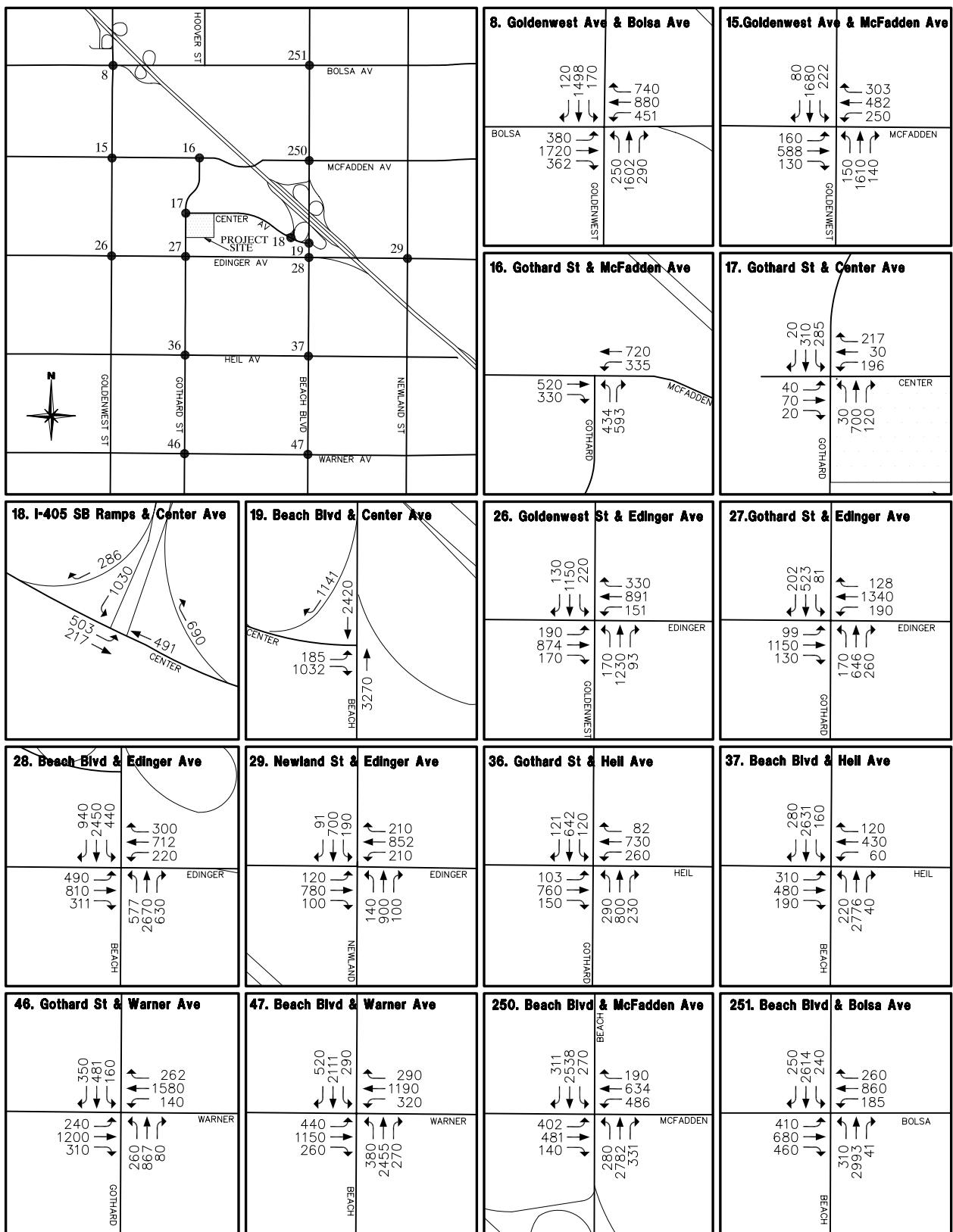


Figure 4-10

YEAR 2030 PM PEAK HOUR VOLUMES  
- WITH-PROJECT

Table 4-2

## 2030 ICU SUMMARY

Intersection	No-Project				With-Project			
	AM		PM		AM		PM	
	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS
8. Goldenwest Ave & Bolsa Ave	.90	D	1.02	F	.90	D	1.02	F
15. Goldenwest Ave & McFadden Ave	.82	D	.81	D	.82	D	.82	D
16. Gothard St & McFadden Ave	.67	B	.64	B	.67	B	.65	B
17. Gothard St & Center Ave	.36	A	.57	A	.38	A	.60	A
18. I-405 SB Ramps & Center Ave	.55	A	.90	D	.56	A	.91*	E
19. Beach Blvd & Center Ave	.78	C	.77	C	.78	C	.77	C
26. Goldenwest St & Edinger Ave	.66	B	.70	B	.66	B	.70	B
27. Gothard St & Edinger Ave	.55	A	.64	B	.55	A	.65	B
28. Beach Blvd & Edinger Ave	.86	D	1.05	F	.86	D	1.05	F
29. Newland St & Edinger Ave	.87	D	.80	C	.87	D	.80	C
36. Gothard St & Heil Ave	.73	C	.78	C	.74	C	.78	C
37. Beach Blvd & Heil Ave	.83	D	.95	E	.83	D	.95	E
46. Gothard St & Warner Ave	.65	B	.84	D	.65	B	.85	D
47. Beach Blvd & Warner Ave	.78	C	.96	E	.78	C	.96	E
250. Beach Blvd & McFadden Ave	.91	E	.95	E	.91	E	.95	E
251. Beach Blvd & Bolsa Ave	.96	E	1.06	F	.96	E	1.06	F

\* Project impact

Level of service ranges: .00 - .60 A  
 .61 - .70 B  
 .71 - .80 C  
 .81 - .90 D  
 .91 – 1.00 E  
 Above 1.00 F

## **FREEWAY RAMP VOLUMES**

A summary of the 2014 and 2030 peak hour volumes and volume/capacity (V/C) ratios for freeway ramps that would be affected by the proposed project can be found in Table 4-3. Included in the table are the project contributions to the ramp V/C ratios.

The I-405 northbound loop ramp from Beach Boulevard is deficient in both the AM and PM peak hours. The project has a significant contribution to this deficiency (more than .01).

## **CALTRANS INTERSECTIONS**

A LOS analysis for 2014 and 2030 was carried out for the Caltrans intersections in the study area using the HCM methodology as described in Chapter 1.0. The calculations were made using Synchro 6.0 software, and for Beach Boulevard the intersections were modeled as a network. The results are summarized in Table 4-4 (note that existing LOS values using this methodology were summarized in Chapter 2.0). In general, the results give similar LOS values compared to those derived using ICU values. The exception is the Beach Boulevard/Edinger Avenue intersection where the theoretical ICU is not able to be achieved for the operational reasons discussed in Chapter 2.0.

## **MITIGATION MEASURES**

The project has a long-range significant impact at the intersection of the I-405 southbound ramps and Center Avenue during the PM peak hour (based on ICU values). This intersection is a candidate for future improvements as part of the I-405 corridor improvements, but at this time no future geometrics have been identified for the intersection, nor has any timetable been established for making improvements.

Accordingly the proposed project mitigation is as follows:

<b>Location</b>	<b>Improvement</b>
I-405 southbound ramps & Center Ave	Change signal operation to provide right turn overlap for westbound right turns (i.e., onto the I-405 southbound on-ramp). Includes necessary modifications to the traffic signal equipment.

Table 4-3

## FUTURE FREEWAY RAMP V/C SUMMARY

Location	Capacity	AM Peak Hour				PM Peak Hour			
		Total Volume	Total V/C	Project Volume	Project V/C *	Total Volume	Total V/C	Project Volume	Project V/C *
<b>YEAR 2014</b>									
I-405/Beach Blvd NB loop on-ramp (from NB Beach Blvd)	900	1,315	1.46	16	.02	1,582	1.76	2	Less than .01
I-405/Beach Blvd NB loop off-ramp (to SB Beach Blvd)	1,200	780	.65	0	Less than .01	1,022	.85	17	.01
I-405/Beach Blvd SB on-ramp at Center Ave	1,800	463	.26	18	.01	1,047	.58	3	Less than .01
I-405/Beach Blvd SB off-ramp at Center Ave	1,500	1,016	.68	0	Less than .01	1,228	.82	16	.01
I-405/Edinger Ave SB direct on-ramp	1,080	692	.64	5	Less than .01	718	.66	1	Less than .01
<b>YEAR 2030</b>									
I-405/Beach Blvd NB loop on-ramp (from NB Beach Blvd)	900	1,427	1.59	16	.02	1,690	1.88	2	Less than .01
I-405/Beach Blvd NB loop off-ramp (to SB Beach Blvd)	1,200	856	.71	0	Less than .01	1,072	.89	17	.01
I-405/Beach Blvd SB on-ramp at Center Ave	1,800	632	.35	18	.01	1,187	.66	3	Less than .01
I-405/Beach Blvd SB off-ramp at Center Ave	1,500	1,114	.74	0	Less than .01	1,298	.87	16	.01
I-405/Edinger Ave SB direct on-ramp	1,080	882	.82	5	Less than .01	771	.71	1	Less than .01
* Project contribution to the total V/C ratio.									

Table 4-4

## LOS SUMMARY FOR CALTRANS INTERSECTIONS

Location	2014 With Project				2030 With Project			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
18. I-405 SB Ramps & Center	29.1	C	36.4	D	28.2	C	43.8	D
19. Beach & Center	15.8	B	27.6	C	16.5	B	30.0	C
28. Beach & Edinger	57.4	E	65.3	E	70.9	E	73.6	E
37. Beach & Heil	16.6	B	17.4	B	21.8	C	36.6	D
47. Beach & Warner	35.1	D	52.5	D	39.0	D	62.7	E
250. Beach & McFadden	28.4	C	34.7	C	38.4	D	50.7	D
251. Beach & Bolsa	36.3	D	38.6	D	54.0	D	99.3	F

The resulting PM peak hour ICU with this improvement is as follows:

	<b>Without Mitigation</b>	<b>With Mitigation</b>
PM Peak Hour ICU	.91	.79

This is a Caltrans intersection and will require Caltrans approval for implementation. Furthermore, it is a long-range improvement (it is not needed in the short-range 2014 time frame) and may be superceded by the I-405 improvement project (see discussion below and in Chapter 5.0).

It should also be noted that this project impact occurs when General Plan land uses are the basis for traffic forecasts in the study area. A General Plan Amendment is currently being processed for The Village at Bella Terra, which will reduce the PM peak hour trip generation. As discussed in greater detail in the next chapter, approval of that GPA would result in future 2030 background conditions such that this intersection would no longer be impacted by The Ripcurl project.

For the northbound I-405 on-ramp deficiency, the necessary future improvement is to widen to two lanes. The Project Study Report/Project Development Assistance (PSR/PDA) currently nearing completion by OCTA includes such a recommendation. Since the timing of that improvement is unknown, the project may have a significant contribution to a short term unmitigated cumulative impact.

# Chapter 5.0

## OTHER ITEMS

This chapter discusses related traffic items such as project access, transit, impacts to the regional freeway system, and Congestion Management Program (CMP) intersections.

### PROJECT ACCESS

A site layout for the proposed project was presented in Chapter 3.0, and this shows three project access locations. Gothard Street will have two access driveways (one with right-in/right-out only) and a third access driveway will be located on Center Avenue.

Figure 5-1 shows the long-range (2030) peak hour volumes for these three access points. None of the existing volumes are high enough to meet a signal warrant, and vehicles will wait for gaps in the traffic stream. Similarly for left turn entering traffic at the two driveways where a left turn is permissible.

Delay values and corresponding levels of service (LOS) calculated using the Highway Capacity Manual (HCM) methodology for unsignalized intersections are as follows:

Driveway 2 (Center Avenue)			Driveway 3 (Gothard Street)		
Movement	Delay	LOS	Movement	Delay	LOS
AM NBL Exiting	10.7 seconds	B	AM WBL Exiting	21.2 seconds	C
AM WBL Entering	7.8 seconds	A	AM SBL Entering	8.8 seconds	A
PM NBL Exiting	19.0 seconds	C	PM WBL Exiting	31.2 seconds	D
PM WBL Entering	8.7 seconds	A	PM SBL Entering	9.8 seconds	A

NBL – northbound left  
WBL – westbound left  
SBL – southbound left

As can be seen here, peak hour delays for exiting and entering vehicles indicate acceptable levels of service. It should be noted that the left turn exiting delay assumes a driveway configuration with separate left and right turn lanes. While a single exiting lane would have similar delay values, vehicle storage needs would be greater than with two lanes. It is recommended that if a single exiting lane is the desired configuration, then a special analysis should be made during site plan review to ensure

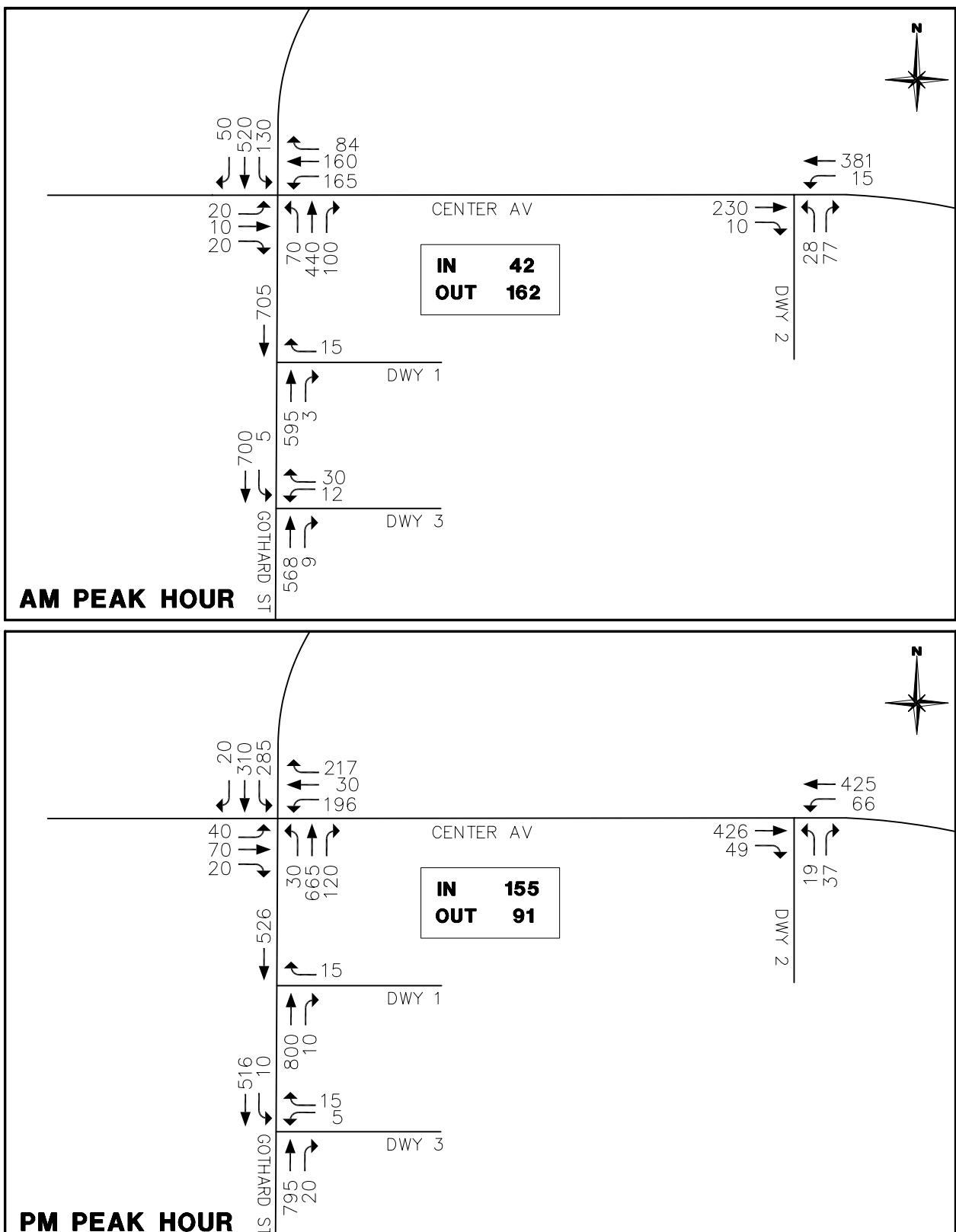


Figure 5-1

2030 PROJECT DRIVEWAY VOLUMES

there is adequate vehicle storage. At the Center Avenue driveway, some minor restriping of the median will be necessary to accommodate the inbound and outbound left turn movements.

## TRANSIT

The trip generation reductions noted in Chapter 3.0 were largely for walk trips to and from both the residential and commercial uses within the project. They also account for trips by other non-private vehicles modes such as bicycle and transit. The Orange County Transportation Authority (OCTA) transit center immediately north of the project provides a convenient location for residential trips to be made by transit. While no specific estimate has been made of such usage, the project trip generation presented here may overestimate the actual trip generation if a significant amount of transit ridership occurs.

The railroad line adjacent to the project currently serves goods movement on an irregular basis. While interest has been expressed in future potential transit uses, no current plans have been formulated, and no studies are currently being carried out to assess the feasibility of this type of use.

## REGIONAL FREEWAY SYSTEM

The freeway impact criteria typically used in Orange County for projects such as this is the CMP threshold of more than three percent. This has been used in absence of any criteria formally specified by Caltrans for State Highway facilities. Project traffic on the adjacent I-405 Freeway for 2030 can be summarized as follows:

Location	Direction			
		Total Volume	Project	(%)
North of Goldenwest	AM NB	11,260	21	.19
North of Goldenwest	PM SB	11,430	22	.19
North of Beach	AM NB	11,620	16	.14
North of Beach	PM SB	11,770	16	.14
South of Beach	PM NB	12,940	22	.17
South of Beach	AM SB	12,740	23	.18

These selected locations have the highest amount of project traffic, and as can be seen do not meet the threshold of more than three percent.

An analysis was made of the Beach Boulevard collector-distributor (CD) roads, the freeway weave sections which carry some project traffic and the freeway mainline sections in the vicinity of the project. The analysis uses 2030 forecasts, and indicates the amount of project traffic where applicable. While 2014 information is not included in this analysis, the project contribution is the same for that year, and the 2030 time frame shows worst case conditions as far as freeway conditions are concerned. The results are given in Appendix D and can be summarized as follows:

2030 LEVEL OF SERVICE - FREEWAY								
Location	Southbound				Northbound			
	Mainline		Weave Section		Mainline		Weave Section	
	AM	PM	AM	PM	AM	PM	AM	PM
Westminster	F (0)	E(.19%)	F(0)	F(.23%)	E(.19%)	F(.02%)	E(.05%)	F(.08%)
Goldenwest	F(0)	E(.14%)	E(0)	F(.53%)	E(.14%)	F(.02%)	E(.05%)	F(.06%)
Beach	F(.18%)	F(.03%)	F(.37%)	F(0)	F(0)	F(17%)	F(0)	F(.95%)
Magnolia	Note: Numbers in parenthesis show percent of project traffic.							

For the Beach Boulevard CD roads, the 2030 results are as follows:

	Southbound		Northbound	
	AM	PM	AM	PM
Volume/Capacity	.46	.87	1.31	1.53
Project V/C	.01	0	.01	.01

A V/C greater than 1.00 represents a deficiency and hence the northbound CD road is deficient in the AM and PM.

For the freeway information presented here, there are no significance criteria other than the CMP three percent value summarized at the beginning of this section. Hence, it can only be noted that the project contributes traffic to a number of 2030 deficiencies on the State Highway system thereby causing a potential significant and unavoidable impact.

## CMP INTERSECTIONS

As shown in Chapter 3.0, the 2014 intersection capacity utilization (ICU) values at the two CMP intersections in the study area are as follows:

Intersection	Without Project		With Project	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Beach Blvd & Edinger Ave	.76	.92	.76	.92
Beach Blvd & Warner Ave	.72	.92	.72	.92

Neither intersection shows ICU values that exceed the allowable CMP threshold of 1.00 and therefore there are no project CMP impacts.

## BELLA TERRA EXPANSION

The City of Huntington Beach is currently processing a development proposal for expanding the Bella Terra shopping center adjacent to the project site. The proposal involves a General Plan Amendment (GPA) that will add both residential and commercial uses to the existing center. Three alternatives are considered in the GPA, and they are referred to as follows:

- Proposed GPA Option 1
- Proposed GPA Option 2
- Alternative GPA (Reduced Project)

Compared to the Proposed GPA Option 1, Option 2 has a hotel and more retail uses but less residential units, and with higher trip generation was used as the basis for the traffic study. While the trip generation for Option 1 was summarized to show the lower trip generation compared to Option 2, a detailed traffic impact analysis was not carried out for this option. The Alternative GPA was studied in detail in the traffic study, giving two GPA scenarios for which project impacts were identified.

The Bella Terra traffic analysis shows that the total PM peak hour trips generated under all three of the GPA scenarios will be less than the current General Plan. Accordingly, the long-range analysis results presented here (which assume General Plan land uses on the Bella Terra site) represent a worst case as far as future background traffic conditions are concerned.

For the intersection of the I-405 Freeway southbound ramps and Center Avenue (where The Ripcurl project impact was identified), an evaluation was made of the project impacts using two of the Bella Terra GPA long-range volumes as a base (Proposed GPA Option 2 and the Alternative GPA). The results are as follows:

2030 ICU COMPARISON – PM PEAK HOUR						
	General Plan	General Plan + The Ripcurl	Bella Terra GPA (1)	GPA (1) + The Ripcurl	Bella Terra GPA (2)	GPA (2) + The Ripcurl
I-405 SB & Center Ave	.90	.91	.90	.90	.90	.90
GPA (1) = Bella Terra Proposed GPA Option 2 GPA (2) = Alternative GPA (Reduced Project)						

As can be seen, the project does not have a significant impact at this location when either of the Bella Terra GPA's are used as a 2030 base.

## I-405 CORRIDOR STUDY

A Project Study Report/Project Development Support (PSR/PDS) for the I-405 Freeway through the City of Huntington Beach and adjacent communities is nearing completion. Improvements being recommended in the study include widening of the freeway, changes to the Beach Boulevard and Goldenwest Street interchange configurations, and buildout to full MPAH standards of all roadway crossings of the freeway (in the study area this will result in the McFadden Avenue overcrossing being widened to four lanes). An upcoming study to prepare a Project Report and Environmental Document (PR/ED) will define the improvements in greater detail and identify potential environmental impacts (this is scheduled to commence in late 2008 and to be completed by 2011).

For the purpose of defining the committed improvements used in this analysis, widening of I-405 by one lane in each direction has been assumed. This is consistent with projects included in the recent Measure M renewal. The improvements to the interchanges, together with the McFadden Avenue overcrossing widening, were not assumed as being committed since funding is not assured at this time. Hence, with respect to these improvements, the traffic study assumes a worst case baseline for CEQA purposes.

## **GOTHARD STREET ARTERIAL HIGHWAY CLASSIFICATION**

The Arterial Highway Plan in the General Plan Circulation Element is defined according to two sets of specifications. The first is the Circulation Plan of Arterial Streets and Highway (CPAS&H) which is generally consistent with the Orange County Master Plan of Arterial Highways (MPAH). The MPAH was discussed in Chapter 2.0 along with a diagram showing the MPAH street classifications in the study area. The second is the “2010 Circulation Plan of Arterial Highways” (2010 CPAH) which augments the basic CPAS&H roadway classifications in selected areas. When questions of right-of-way arise, it is typically the 2010 CPAH that is used to define the appropriate roadway section. Additionally, the City has established a process by ordinance that defines in more detail the specific dimensions and alignment of roadways through the adoption of an individual Precise Plan of Street Alignment for a given street segment. Typically, the Precise Plan of Street Alignment will take precedence over the 2010 CPAH.

The section of Gothard Street adjacent to the project is an example of where the CPAS&H and the 2010 CPAH have different classifications and a Precise Plan of Street Alignment has been adopted by the City Council. The CPAS&H and Precise Plan of Street Alignment show the roadway as a four-lane roadway. The CPAS&H provides for the roadway to be undivided while the Precise Plan of Street Alignment provides a divided street section. The 2010 CPAH shows a six lane Major (six lanes divided) classification. The street is currently built as a four lane divided roadway with bike lanes within a typical Secondary Arterial right-of-way. This is accomplished by providing minimum (rather than desirable) lane dimensions in all lanes.

The four lane Secondary Arterial ADT capacity as specified in the Circulation Element is 20,000 vehicles per day. Reference to the 2030 ADT volume diagram in Chapter 4.0 shows a 2030 ADT of 16,000 on the section of Gothard Street between Center Avenue and Edinger Avenue, within the capacity of a four lane Secondary. However, that volume is based on committed improvements only, which is the basis for this traffic analysis. It does not assume the Gothard Street – Hoover Street connection which is part of the MPAH, CPAS&H, and 2010 CPAH.

A special analysis was thereby made of 2030 volumes with the Gothard Street – Hoover Street connection, and the volume on Gothard Street between Center Avenue and Edinger Avenue is 22,000 ADT with that connection. This is just over the capacity of a Secondary Highway but well within the 30,000 ADT capacity of a Primary Arterial. Hence, on an ADT basis, the existing roadway section with

four lanes and a median is adequate to serve the future demand, and the roadway could be reclassified from a Major Arterial (per the 2010 CPAH) to a Primary Arterial.

The Precise Plan of Street Alignment requires an additional dedication of 10 feet, with 5 feet being dedicated from both the east and west side abutting properties. This dedication would allow for future restriping of the roadway to provide standard lane widths. The additional lane widths would help to facilitate safe traffic movement, accommodate larger vehicles more easily and reduce motor vehicle encroachment or crowding of the bicycle lanes.

# Appendix A

## INTERSECTION CAPACITY UTILIZATION WORKSHEETS

Peak hour intersection volume/capacity ratios are calculated by means of intersection capacity utilization (ICU) values. ICU calculations were performed for the intersections shown in Figure A-1.

The procedure is based on the critical movement methodology, and shows the amount of capacity utilized by each critical move. A capacity of 1700 vehicles per hour (VPH) per lane is assumed together with a .05 clearance interval. A "de-facto" right-turn lane is used in the ICU calculation for cases where a curb lane is wide enough to separately serve both thru and right-turn traffic (typically with a width of 19 feet from curb to outside of thru-lane with parking prohibited during peak periods). Such lanes are treated the same as striped right-turn lanes during the ICU calculations, but they are denoted on the ICU calculation worksheets using the letter "d" in place of a numerical entry for right-turn lanes.

The methodology also incorporates a check for right-turn capacity utilization. Both right-turn-on-green (RTOG) and right-turn-on-red (RTOR) capacity availability are calculated and checked against the total right-turn capacity need. If insufficient capacity is available, then an adjustment is made to the total capacity utilization value. The following example shows how this adjustment is made.

### Example For Northbound Right

#### 1. Right-Turn-On-Green (RTOG)

If NBT is critical move, then:

$$\text{RTOG} = \text{V/C (NBT)}$$

Otherwise,

$$\text{RTOG} = \text{V/C (NBL)} + \text{V/C (SBT)} - \text{V/C (SBL)}$$

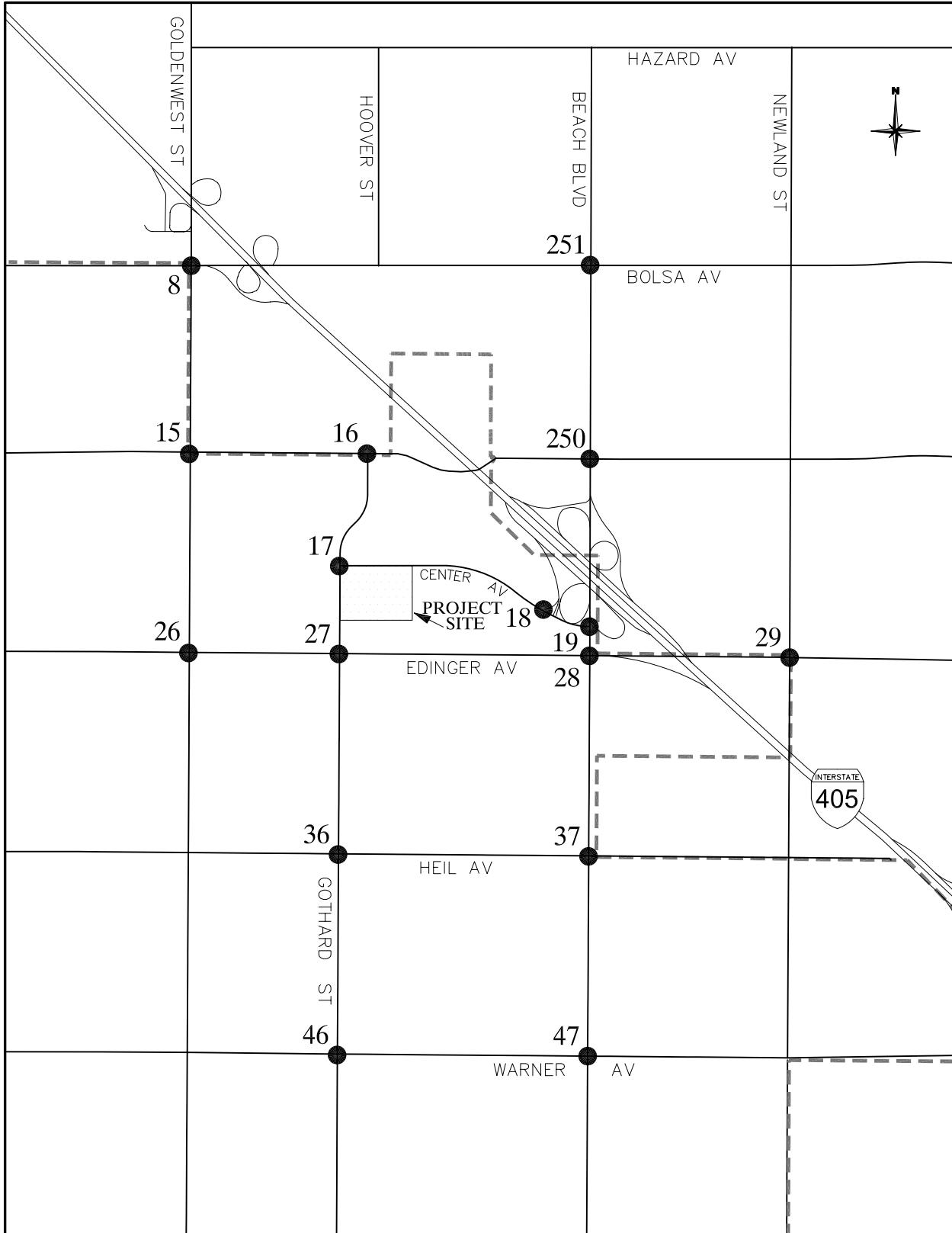
#### 2. Right-Turn-On-Red (RTOR)

If WBL is critical move, then:

$$\text{RTOR} = \text{V/C (WBL)}$$

Otherwise,

$$\text{RTOR} = \text{V/C (EBL)} + \text{V/C (WBT)} - \text{V/C (EBT)}$$



Legend



City Limits

Figure A-1

INTERSECTION LOCATION MAP

### 3. Right-Turn Overlap Adjustment

If the northbound right is assumed to overlap with the adjacent westbound left, adjustments to the RTOG and RTOR values are made as follows:

$$\text{RTOG} = \text{RTOG} + \text{V/C (WBL)}$$

$$\text{RTOR} = \text{RTOR} - \text{V/C (WBL)}$$

### 4. Total Right-Turn Capacity (RTC) Availability For NBR

$$\text{RTC} = \text{RTOG} + \text{factor} \times \text{RTOR}$$

Where factor = RTOR saturation flow factor (75%)

Right-turn adjustment is then as follows: Additional ICU = V/C (NBR) - RTC

A zero or negative value indicates that adequate capacity is available and no adjustment is necessary. A positive value indicates that the available RTOR and RTOG capacity does not adequately accommodate the right-turn V/C, therefore the right-turn is essentially considered to be a critical movement. In such cases, the right-turn adjustment is noted on the ICU worksheet and it is included in the total capacity utilization value. When it is determined that a right-turn adjustment is required for more than one right-turn movement, the word "multi" is printed on the worksheet instead of an actual right-turn movement reference, and the right-turn adjustments are cumulatively added to the total capacity utilization value. In such cases, further operational evaluation is typically carried out to determine if under actual operational conditions, the critical right-turns would operate simultaneously, and therefore a right-turn adjustment credit should be applied.

### **Shared Lane V/C Methodology**

For intersection approaches where shared usage of a lane is permitted by more than one turn movement (e.g., left/thru, thru/right, left/thru/right), the individual turn volumes are evaluated to determine whether dedication of the shared lane is warranted to any one given turn movement. The following example demonstrates how this evaluation is carried out:

#### **Example for Shared Left/Thru Lane**

##### 1. Average Lane Volume (ALV)

$$\text{ALV} = \frac{\text{Left-Turn Volume} + \text{Thru Volume}}{\text{Total Left} + \text{Thru Approach Lanes (including shared lane)}}$$

##### 2. ALV for Each Approach

$$ALV \text{ (Left)} = \frac{\text{Left-Turn Volume}}{\text{Left Approach Lanes (including shared lane)}}$$

$$ALV \text{ (Thru)} = \frac{\text{Thru Volume}}{\text{Thru Approach Lanes (including shared lane)}}$$

### 3. Lane Dedication is Warranted

If ALV (Left) is greater than ALV then full dedication of the shared lane to the left-turn approach is warranted. Left-turn and thru V/C ratios for this case are calculated as follows:

$$V/C \text{ (Left)} = \frac{\text{Left-Turn Volume}}{\text{Left Approach Capacity (including shared lane)}}$$

$$V/C \text{ (Thru)} = \frac{\text{Thru Volume}}{\text{Thru Approach Capacity (excluding shared lane)}}$$

Similarly, if ALV (Thru) is greater than ALV then full dedication to the thru approach is warranted, and left-turn and thru V/C ratios are calculated as follows:

$$V/C \text{ (Left)} = \frac{\text{Left-Turn Volume}}{\text{Left Approach Capacity (excluding shared lane)}}$$

$$V/C \text{ (Thru)} = \frac{\text{Thru Volume}}{\text{Thru Approach Capacity (including shared lane)}}$$

### 4. Lane Dedication is not Warranted

If ALV (Left) and ALV (Thru) are both less than ALV, the left/thru lane is assumed to be truly shared and each left, left/thru or thru approach lane carries an evenly distributed volume of traffic equal to ALV. A combined left/thru V/C ratio is calculated as follows:

$$V/C \text{ (Left/Thru)} = \frac{\text{Left-Turn Volume} + \text{Thru Volume}}{\text{Total Left + Thru Approach Capacity (including shared lane)}}$$

This V/C (Left/Thru) ratio is assigned as the V/C (Thru) ratio for the critical movement analysis and ICU summary listing.

If split phasing has not been designated for this approach, the relative proportion of V/C (Thru) that is attributed to the left-turn volume is estimated as follows:

If approach has more than one left-turn (including shared lane), then:

$$V/C \text{ (Left)} = V/C \text{ (Thru)}$$

If approach has only one left-turn lane (shared lane), then:

$$V/C \text{ (Left)} = \frac{\text{Left-Turn Volume}}{\text{Single Approach Lane Capacity}}$$

If this left-turn movement is determined to be a critical movement, the V/C (Left) value is posted in brackets on the ICU summary printout.

These same steps are carried out for shared thru/right lanes. If full dedication of a shared thru/right lane to the right-turn movement is warranted, the right-turn V/C value calculated in step three is checked against the RTOR and RTOG capacity availability if the option to include right-turns in the V/C ratio calculations is selected. If the V/C value that is determined using the shared lane methodology described here is reduced due to RTOR and RTOG capacity availability, the V/C value for the thru/right lanes is posted in brackets.

When an approach contains more than one shared lane (e.g., left/thru and thru/right), steps one and two listed above are carried out for the three turn movements combined. Step four is carried out if dedication is not warranted for either of the shared lanes. If dedication of one of the shared lanes is warranted to one movement or another, step three is carried out for the two movements involved, and then steps one through four are repeated for the two movements involved in the other shared lane.

**EXISTING**

8. Goldenwest St & Bolsa Ave

Existing						
	LANES	CAPACITY	AM PK HOUR VOL	V/C	PM PK HOUR VOL	V/C
NBL	2	3400	100	.03	220	.06
NBT	3	5100	1120	.25*	1430	.33*
NBR	0	0	180		250	
SBL	1	1700	160	.09*	140	.08*
SBT	3	5100	1470	.29	1350	.26
SBR	d	1700	100	.06	110	.06
EBL	2	3400	140	.04*	370	.11
EBT	3	5100	590	.12	1190	.23*
EBR	1	1700	120	.07	340	.20
WBL	2	3400	280	.08	310	.09*
WBT	3	5100	1060	.21*	650	.13
WBR	1	1700	380	.22	560	.33
Right Turn Adjustment					WBR	.08*
Clearance Interval			.05*			.05*
TOTAL CAPACITY UTILIZATION			.64		.86	

15. Goldenwest St & Mcfadden Ave

Existing						
	LANES	CAPACITY	AM PK HOUR VOL	V/C	PM PK HOUR VOL	V/C
NBL	1	1700	100	.06*	100	.06
NBT	3	5100	1020	.20	1310	.26*
NBR	d	1700	70	.04	100	.06
SBL	1	1700	220	.13	180	.11*
SBT	3	5100	1490	.31*	1480	.30
SBR	0	0	70		70	
EBL	1	1700	140	.08	140	.08
EBT	2	3400	520	.15*	580	.17*
EBR	d	1700	190	.11	130	.08
WBL	1	1700	180	.11*	220	.13*
WBT	2	3400	550	.16	470	.14
WBR	d	1700	140	.08	290	.17
Clearance Interval					.05*	.05*
TOTAL CAPACITY UTILIZATION					.68	.72

16. Gothard St & Mcfadden Ave

Existing						
	LANES	CAPACITY	AM PK HOUR VOL	V/C	PM PK HOUR VOL	V/C
NBL	2	3400	190	.06*	420	.12*
NBT	0	0	0		0	
NBR	1	1700	240	.14	420	.25
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	660	.19*	520	.15*
EBR	d	1700	360	.21	280	.16
WBL	1	1700	300	.18*	200	.12*
WBT	2	3400	570	.17	710	.21
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.07*
Clearance Interval			.05*			.05*
TOTAL CAPACITY UTILIZATION			.48		.51	

17. Gothard St & Center Ave

Existing						
	LANES	CAPACITY	AM PK HOUR VOL	V/C	PM PK HOUR VOL	V/C
NBL	1	1700	70	.04	30	.02
NBT	2	3400	360	.11*	630	.19*
NBR	d	1700	90	.05	100	.06
SBL	1	1700	90	.05*	130	.08*
SBT	2	3400	350	.10	310	.09
SBR	d	1700	40	.02	10	.01
EBL	1	1700	10	.01	20	.01
EBT	1	1700	10	.02*	50	.04*
EBR	0	0	20		20	
WBL	1	1700	80	.05*	180	.11*
WBT	2	3400	50	.03	20	.01
WBR	0	0	40		140	.08
Clearance Interval					.05*	.05*
TOTAL CAPACITY UTILIZATION					.28	.47

**18. I-405 SB Ramps & Center Ave**

Existing							
	LANES	CAPACITY	AM PK VOL	HOUR V/C	PM PK VOL	HOUR V/C	
NBL	0	0	0		0		
NBT	0	0	0		0		
NBR	0	0	0		0		
SBL	2	3400	800	.24*	930	.27*	
SBT	0	0	0		0		
SBR	1	1700	150	.09	200	.12	
EBL	1	1700	50	.03*	350	.21*	
EBT	2	3400	90	.03	210	.06	
EBR	0	0	0		0		
WBL	0	0	0		0		
WBT	2	3400	260	.08*	240	.07*	
WBR	1	1700	310	.18	610	.36	
Right Turn Adjustment					WBR	.15*	
Clearance Interval			.05*			.05*	
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.40</b>		<b>.75</b>		

**19. Beach Blvd & Center Ave**

Existing							
	LANES	CAPACITY	AM PK VOL	HOUR V/C	PM PK VOL	HOUR V/C	
NBL	0	0	0		0		
NBT	4	6800	2320	.34	2740	.40*	
NBR	0	0	0		0		
SBL	0	0	0		0		
SBT	4	6800	2550	.38*	2090	.31	
SBR	f		520		820		
EBL	2	3400	80	.02*	160	.05*	
EBT	0	0	0		0		
EBR	2	3400	830	.24	960	.28	
WBL	0	0	0		0		
WBT	0	0	0		0		
WBR	0	0	0		0		
Right Turn Adjustment					EBR	.22*	EBR
Clearance Interval			.05*			.18*	.05*
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.67</b>		<b>.68</b>		

**26. Goldenwest St & Edinger Ave**

Existing							
	LANES	CAPACITY	AM PK VOL	HOUR V/C	PM PK VOL	HOUR V/C	
NBL	1	1700	130	.08	160	.09	
NBT	3	5100	1130	.22*	1130	.22*	
NBR	d	1700	100	.06	80	.05	
SBL	1	1700	190	.11*	210	.12*	
SBT	3	5100	1110	.22	1060	.21	
SBR	d	1700	110	.06	100	.06	
EBL	1	1700	150	.09	120	.07*	
EBT	3	5100	1000	.20*	670	.13	
EBR	d	1700	110	.06	160	.09	
WBL	1	1700	60	.04*	140	.08	
WBT	3	5100	480	.09	720	.14*	
WBR	d	1700	80	.05	230	.14	
Clearance Interval			.05*		.05*		
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.62</b>		<b>.60</b>		

**27. Gothard St & Edinger Ave**

Existing							
	LANES	CAPACITY	AM PK VOL	HOUR V/C	PM PK VOL	HOUR V/C	
NBL	1	1700	120	.07*	120	.07	
NBT	2	3400	430	.13	630	.19*	
NBR	d	1700	90	.05	210	.12	
SBL	1	1700	40	.02	70	.04*	
SBT	2	3400	290	.09*	440	.13	
SBR	d	1700	90	.05	160	.09	
EBL	1	1700	90	.05*	80	.05*	
EBT	3	5100	900	.18	1030	.20	
EBR	d	1700	100	.06	120	.07	
WBL	1	1700	90	.05	120	.07	
WBT	3	5100	960	.21*	1110	.24*	
WBR	0	0	90		110		
Clearance Interval					.05*		.05*
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.47</b>		<b>.57</b>		

**28. Beach Blvd & Edinger Ave**

Existing							
	LANES	CAPACITY	AM PK HOUR VOL	V/C	PM PK HOUR VOL	V/C	
NBL	2	3400	130	.04	550	.16	
NBT	3	5100	1690	.33*	2290	.45*	
NBR	1	1700	390	.23	560	.33	
SBL	2	3400	490	.14*	360	.11*	
SBT	4	6800	2570	.38	2340	.34	
SBR	2	3400	300	.09	680	.20	
EBL	2	3400	170	.05	350	.10*	
EBT	3	5100	670	.13*	710	.14	
EBR	1	1700	120	.07	290	.17	
WBL	1	1700	100	.06*	200	.12	
WBT	2	3400	370	.11	580	.17*	
WBR	1	1700	300	.18	270	.16	
Clearance Interval			.05*		.05*		

TOTAL CAPACITY UTILIZATION .71 .88

**29. Newland St & Edinger Ave**

Existing							
	LANES	CAPACITY	AM PK HOUR VOL	V/C	PM PK HOUR VOL	V/C	
NBL	1	1700	180	.11*	110	.06	
NBT	2	3400	400	.15	680	.23*	
NBR	0	0	110		90		
SBL	1	1700	170	.10	100	.06*	
SBT	2	3400	540	.18*	580	.19	
SBR	0	0	80		80		
EBL	1	1700	30	.02	110	.06	
EBT	2	3400	840	.25*	660	.19*	
EBR	d	1700	90	.05	90	.05	
WBL	1	1700	200	.12*	160	.09*	
WBT	2	3400	660	.19	710	.21	
WBR	d	1700	80	.05	180	.11	
Clearance Interval			.05*		.05*		

TOTAL CAPACITY UTILIZATION .71 .62

**36. Gothard St & Heil Ave**

Existing							
	LANES	CAPACITY	AM PK HOUR VOL	V/C	PM PK HOUR VOL	V/C	
NBL	1	1700	130	.08*	270	.16*	
NBT	2	3400	570	.17	700	.21	
NBR	d	1700	120	.07	140	.08	
SBL	1	1700	40	.02	70	.04	
SBT	2	3400	520	.15*	550	.16*	
SBR	d	1700	40	.02	120	.07	
EBL	1	1700	120	.07	90	.05	
EBT	2	3400	670	.20*	530	.16*	
EBR	d	1700	180	.11	150	.09	
WBL	1	1700	130	.08*	150	.09*	
WBT	2	3400	400	.12	540	.16	
WBR	d	1700	30	.02	60	.04	
Clearance Interval			.05*		.05*		

TOTAL CAPACITY UTILIZATION .56 .62

**37. Beach Blvd & Heil Ave**

Existing							
	LANES	CAPACITY	AM PK HOUR VOL	V/C	PM PK HOUR VOL	V/C	
NBL	1	1700	150	.09*	190	.11*	
NBT	4	6800	2080	.31	2570	.38	
NBR	0	0	20		40		
SBL	1	1700	70	.04	150	.09	
SBT	4	6800	2540	.40*	2530	.40*	
SBR	0	0	180		210		
EBL	1	1700	170	.10*	170	.10*	
EBT	2	3400	420	.12	300	.09	
EBR	d	1700	210	.12	170	.10	
WBL	1	1700	50	.03	50	.03	
WBT	1	1700	240	.14*	230	.14*	
WBR	1	1700	80	.05	110	.06	
Clearance Interval			.05*		.05*		

TOTAL CAPACITY UTILIZATION .78 .80

**46. Gothard St & Warner Ave**

Existing						
	LANES	CAPACITY	AM PK HOUR VOL	V/C	PM PK HOUR VOL	V/C
NBL	1	1700	130	.08	250	.15
NBT	2	3400	380	.11*	720	.21*
NBR	d	1700	40	.02	70	.04
SBL	1	1700	130	.08*	150	.09*
SBT	2	3400	340	.10	470	.14
SBR	d	1700	40	.02	180	.11
EBL	1	1700	180	.11	220	.13*
EBT	3	5100	1370	.27*	1070	.21
EBR	1	1700	200	.12	300	.18
WBL	1	1700	80	.05*	60	.04
WBT	3	5100	730	.14	1470	.29*
WBR	d	1700	120	.07	230	.14
Clearance Interval			.05*		.05*	

TOTAL CAPACITY UTILIZATION .56 .77

**47. Beach Blvd & Warner Ave**

Existing						
	LANES	CAPACITY	AM PK HOUR VOL	V/C	PM PK HOUR VOL	V/C
NBL	2	3400	150	.04*	350	.10
NBT	4	6800	1320	.21	2330	.38*
NBR	0	0	110		260	
SBL	2	3400	260	.08	270	.08*
SBT	4	6800	1830	.27*	2050	.30
SBR	1	1700	240	.14	470	.28
EBL	2	3400	290	.09	430	.13*
EBT	3	5100	1160	.26*	1000	.25
EBR	0	0	160		250	
WBL	2	3400	250	.07*	290	.09
WBT	3	5100	700	.15	1100	.25*
WBR	0	0	60		200	
Clearance Interval			.05*		.05*	

TOTAL CAPACITY UTILIZATION .69 .89

**250. Beach Blvd & McFadden Ave**

Existing						
	LANES	CAPACITY	AM PK HOUR VOL	V/C	PM PK HOUR VOL	V/C
NBL	2	3400	190	.06*	270	.08
NBT	4	6800	1910	.30	2330	.38*
NBR	0	0	120		270	
SBL	2	3400	200	.06	240	.07*
SBT	4	6800	2360	.39*	2090	.34
SBR	0	0	270		240	
EBL	2	3400	270	.08*	360	.11*
EBT	2	3400	370	.15	460	.18
EBR	0	0	130		140	
WBL	2	3400	350	.10	390	.11
WBT	2	3400	520	.20*	490	.20*
WBR	0	0	170		180	
Clearance Interval			.05*		.05*	

TOTAL CAPACITY UTILIZATION .78 .81

**251. Beach Blvd & Bolsa Ave**

Existing						
	LANES	CAPACITY	AM PK HOUR VOL	V/C	PM PK HOUR VOL	V/C
NBL	2	3400	270	.08*	230	.07
NBT	4	6800	1960	.29	2510	.37*
NBR	0	0	10		40	
SBL	2	3400	150	.04	230	.07*
SBT	4	6800	2210	.35*	2210	.35
SBR	0	0	150		170	
EBL	1	1700	170	.10*	200	.12*
EBT	2	3400	480	.14	570	.17
EBR	1	1700	490	.29	360	.21
WBL	1	1700	130	.08	150	.09
WBT	2	3400	560	.16*	600	.18*
WBR	1	1700	180	.11	250	.15
Right Turn Adjustment			EBR		.07*	
Clearance Interval					.05*	.05*

TOTAL CAPACITY UTILIZATION .81 .79

2014 AND 2030

8. Goldenwest Ave & Bolsa Ave

Year 2014 No-Project								Year 2014 With-Project								
	LANES	CAPACITY	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR		
NBL	2	3400	100	.03	230	.07						NBL	2	3400	103	.03
NBT	3	5100	1180	.27*	1480	.34*						NBT	3	5100	1190	.27*
NBR	0	0	190		260							NBR	0	0	192	
SBL	1	1700	230	.14*	150	.09*						SBL	1	1700	230	.14*
SBT	3	5100	1490	.29	1390	.27						SBT	3	5100	1490	.29
SBR	d	1700	110	.06	110	.06						SBR	d	1700	110	.06
EBL	2	3400	160	.05*	370	.11						EBL	2	3400	160	.05*
EBT	3	5100	590	.12	1350	.26*						EBT	3	5100	590	.12
EBR	1	1700	120	.07	350	.21						EBR	1	1700	120	.07
WBL	2	3400	320	.09	350	.10*						WBL	2	3400	320	.09
WBT	3	5100	1160	.23*	720	.14						WBT	3	5100	1160	.23*
WBR	1	1700	420	.25	610	.36						WBR	1	1700	420	.25
Right Turn Adjustment					WBR	.07*						Right Turn Adjustment			WBR	.07*
Clearance Interval				.05*		.05*						Clearance Interval			WBR	.05*
TOTAL CAPACITY UTILIZATION			.74		.91				TOTAL CAPACITY UTILIZATION			.74		.91		

Year 2030 No-Project								Year 2030 With-Project								
	LANES	CAPACITY	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR		
NBL	2	3400	100	.03	250	.07						NBL	2	3400	103	.03
NBT	3	5100	1310	.30*	1600	.37*						NBT	3	5100	1320	.30*
NBR	0	0	220		290							NBR	0	0	222	
SBL	1	1700	380	.22*	170	.10*						SBL	1	1700	380	.22*
SBT	3	5100	1540	.30	1490	.29						SBT	3	5100	1540	.30
SBR	d	1700	120	.07	120	.07						SBR	d	1700	120	.07
EBL	2	3400	210	.06*	380	.11						EBL	2	3400	210	.06*
EBT	3	5100	600	.12	1720	.34*						EBT	3	5100	600	.12
EBR	1	1700	130	.08	360	.21						EBR	1	1700	130	.08
WBL	2	3400	410	.12	450	.13*						WBL	2	3400	410	.12
WBT	3	5100	1390	.27*	880	.17						WBT	3	5100	1390	.27*
WBR	1	1700	500	.29	740	.44						WBR	1	1700	500	.29
Right Turn Adjustment					WBR	.03*						Right Turn Adjustment			WBR	.03*
Clearance Interval				.05*		.05*						Clearance Interval			WBR	.05*
TOTAL CAPACITY UTILIZATION			.90		1.02				TOTAL CAPACITY UTILIZATION			.90		1.02		

15. Goldenwest Ave & McFadden Ave

Year 2014 No-Project						Year 2014 With-Project							
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR		
NBL	1	1700	100	.06*	120	.07*	NBL	1	1700	100	.06*	120	.07
NBT	3	5100	1110	.22	1400	.27	NBT	3	5100	1110	.22	1400	.27*
NBR	d	1700	70	.04	110	.06	NBR	d	1700	70	.04	110	.06
SBL	1	1700	220	.13	190	.11	SBL	1	1700	220	.13	202	.12*
SBT	3	5100	1570	.32*	1540	.32*	SBT	3	5100	1570	.32*	1540	.32
SBR	0	0	80		70		SBR	0	0	80		70	
EBL	1	1700	140	.08	150	.09	EBL	1	1700	140	.08	150	.09
EBT	2	3400	520	.15*	580	.17*	EBT	2	3400	520	.15*	588	.17*
EBR	d	1700	190	.11	130	.08	EBR	d	1700	190	.11	130	.08
WBL	1	1700	220	.13*	230	.14*	WBL	1	1700	220	.13*	230	.14*
WBT	2	3400	550	.16	470	.14	WBT	2	3400	560	.16	472	.14
WBR	d	1700	140	.08	290	.17	WBR	d	1700	157	.09	293	.17
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*	
TOTAL CAPACITY UTILIZATION			.71		.75		TOTAL CAPACITY UTILIZATION			.71		.75	

Year 2030 No-Project						Year 2030 With-Project							
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR		
NBL	1	1700	110	.06*	150	.09*	NBL	1	1700	110	.06*	150	.09
NBT	3	5100	1320	.26	1610	.32	NBT	3	5100	1320	.26	1610	.32*
NBR	d	1700	80	.05	140	.08	NBR	d	1700	80	.05	140	.08
SBL	1	1700	220	.13	210	.12	SBL	1	1700	220	.13	222	.13*
SBT	3	5100	1760	.36*	1680	.35*	SBT	3	5100	1760	.36*	1680	.35
SBR	0	0	90		80		SBR	0	0	90		80	
EBL	1	1700	150	.09	160	.09	EBL	1	1700	150	.09	160	.09
EBT	2	3400	530	.16*	580	.17*	EBT	2	3400	530	.16*	588	.17*
EBR	d	1700	200	.12	130	.08	EBR	d	1700	200	.12	130	.08
WBL	1	1700	320	.19*	250	.15*	WBL	1	1700	320	.19*	250	.15*
WBT	2	3400	560	.16	480	.14	WBT	2	3400	570	.17	482	.14
WBR	d	1700	150	.09	300	.18	WBR	d	1700	167	.10	303	.18
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*	
TOTAL CAPACITY UTILIZATION			.82		.81		TOTAL CAPACITY UTILIZATION			.82		.82	

16. Gothard St & Mcfadden Ave

Year 2014 No-Project						Year 2014 With-Project							
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR		
NBL	2	3400	190	.06*	420	.12*	NBL	2	3400	217	.06*	424	.12*
NBT	0	0	0		0		NBT	0	0	0		0	
NBR	1	1700	300	.18	470	.28	NBR	1	1700	318	.19	473	.28
SBL	0	0	0		0		SBL	0	0	0		0	
SBT	0	0	0		0		SBT	0	0	0		0	
SBR	0	0	0		0		SBR	0	0	0		0	
EBL	0	0	0		0		EBL	0	0	0		0	
EBT	2	3400	660	.19*	520	.15*	EBT	2	3400	660	.19*	520	.15*
EBR	d	1700	390	.23	290	.17	EBR	d	1700	390	.23	310	.18
WBL	1	1700	330	.19*	240	.14*	WBL	1	1700	330	.19*	255	.15*
WBT	2	3400	590	.17	710	.21	WBT	2	3400	590	.17	710	.21
WBR	0	0	0		0		WBR	0	0	0		0	
Right Turn Adjustment	Multi		.03*		NBR	.09*	Right Turn Adjustment	Multi		.04*		NBR	.08*
Clearance Interval			.05*			.05*	Clearance Interval			.05*			.05*
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.52</b>			<b>.55</b>	<b>TOTAL CAPACITY UTILIZATION</b>			<b>.53</b>		<b>.55</b>	

Year 2030 No-Project						Year 2030 With-Project							
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR		
NBL	2	3400	200	.06*	430	.13*	NBL	2	3400	227	.07*	434	.13*
NBT	0	0	0		0		NBT	0	0	0		0	
NBR	1	1700	430	.25	590	.35	NBR	1	1700	448	.26	593	.35
SBL	0	0	0		0		SBL	0	0	0		0	
SBT	0	0	0		0		SBT	0	0	0		0	
SBR	0	0	0		0		SBR	0	0	0		0	
EBL	0	0	0		0		EBL	0	0	0		0	
EBT	2	3400	670	.20*	520	.15*	EBT	2	3400	670	.20*	520	.15*
EBR	d	1700	470	.28	310	.18	EBR	d	1700	470	.28	330	.19
WBL	1	1700	410	.24*	320	.19*	WBL	1	1700	410	.24*	335	.20*
WBT	2	3400	620	.18	720	.21	WBT	2	3400	620	.18	720	.21
WBR	0	0	0		0		WBR	0	0	0		0	
Right Turn Adjustment	Multi		.12*		NBR	.12*	Right Turn Adjustment	Multi		.11*		NBR	.12*
Clearance Interval			.05*			.05*	Clearance Interval			.05*			.05*
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.67</b>			<b>.64</b>	<b>TOTAL CAPACITY UTILIZATION</b>			<b>.67</b>		<b>.65</b>	

**17. Gothard St & Center Ave**

Year 2014 No-Project						Year 2014 With-Project									
	LANES	CAPACITY	AM PK HOUR		V/C	PM PK HOUR		V/C	LANES	CAPACITY	AM PK HOUR		PM PK HOUR		
			VOL	V/C		VOL	V/C				VOL	V/C	VOL	V/C	
NBL	1	1700	70	.04		30	.02		NBL	1	1700	70	.04	30	.02
NBT	2	3400	380	.11*		650	.19*		NBT	2	3400	380	.11*	650	.19*
NBR	d	1700	90	.05		100	.06		NBR	d	1700	90	.05	110	.06
SBL	1	1700	100	.06*		170	.10*		SBL	1	1700	100	.06*	205	.12*
SBT	2	3400	400	.12		310	.09		SBT	2	3400	400	.12	310	.09
SBR	d	1700	40	.02		10	.01		SBR	d	1700	40	.02	10	.01
EBL	1	1700	10	.01		30	.02		EBL	1	1700	10	.01	30	.02
EBT	1	1700	10	.02*		60	.05*		EBT	1	1700	10	.02*	60	.05*
EBR	0	0	20			20			EBR	0	0	20		20	
WBL	1	1700	100	.06*		180	.11*		WBL	1	1700	135	.08*	186	.11*
WBT	2	3400	80	.04		20	.01		WBT	2	3400	80	.05	20	.01
WBR	0	0	40			160	.09		WBR	0	0	84	.05	167	.10
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*			
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.30</b>		<b>.50</b>		<b>TOTAL CAPACITY UTILIZATION</b>			<b>.32</b>		<b>.52</b>			

Year 2030 No-Project						Year 2030 With-Project						AM PK HOUR		PM PK HOUR	
	LANES	CAPACITY	AM PK HOUR		V/C	PM PK HOUR		V/C	LANES	CAPACITY	AM PK HOUR		PM PK HOUR		
			VOL	V/C		VOL	V/C				VOL	V/C	VOL	V/C	
NBL	1	1700	70	.04		30	.02		NBL	1	1700	70	.04	30	.02
NBT	2	3400	440	.13*		700	.21*		NBT	2	3400	440	.13*	700	.21*
NBR	d	1700	100	.06		110	.06		NBR	d	1700	100	.06	120	.07
SBL	1	1700	130	.08*		250	.15*		SBL	1	1700	130	.08*	285	.17*
SBT	2	3400	520	.15		310	.09		SBT	2	3400	520	.15	310	.09
SBR	d	1700	50	.03		20	.01		SBR	d	1700	50	.03	20	.01
EBL	1	1700	20	.01		40	.02		EBL	1	1700	20	.01	40	.02
EBT	1	1700	10	.02*		70	.05*		EBT	1	1700	10	.02*	70	.05*
EBR	0	0	20			20			EBR	0	0	20		20	
WBL	1	1700	130	.08*		190	.11*		WBL	1	1700	165	.10*	196	.12*
WBT	2	3400	160	.06		30	.02		WBT	2	3400	160	.07	30	.02
WBR	0	0	40			210	.12		WBR	0	0	84		217	.13
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*			
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.36</b>		<b>.57</b>		<b>TOTAL CAPACITY UTILIZATION</b>			<b>.38</b>		<b>.60</b>			

18. I-405 SB Ramps & Center Ave

Year 2014 No-Project						Year 2014 With-Project							
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR		
NBL	0	0	0		0		NBL	0	0		0		
NBT	0	0	0		0		NBT	0	0		0		
NBR	0	0	0		0		NBR	0	0		0		
SBL	2	3400	840	.25*	960	.28*	SBL	2	3400	840	.25*	960	.28*
SBT	0	0	0		0		SBT	0	0		0		
SBR	1	1700	160	.09	220	.13	SBR	1	1700	160	.09	236	.14
EBL	1	1700	70	.04*	400	.24*	EBL	1	1700	88	.05*	403	.24*
EBT	2	3400	90	.03	210	.06	EBT	2	3400	133	.04	217	.06
EBR	0	0	0		0		EBR	0	0		0		
WBL	0	0	0		0		WBL	0	0		0		
WBT	2	3400	330	.10*	310	.09*	WBT	2	3400	330	.10*	341	.10*
WBR	1	1700	380	.22	630	.37	WBR	1	1700	380	.22	630	.37
Right Turn Adjustment					WBR	.14*	Right Turn Adjustment				WBR	.13*	
Clearance Interval			.05*			.05*	Clearance Interval					.05*	
TOTAL CAPACITY UTILIZATION			.44			.80	TOTAL CAPACITY UTILIZATION			.45		.80	

Year 2030 No-Project						Year 2030 With-Project							
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR		
NBL	0	0	0		0		NBL	0	0		0		
NBT	0	0	0		0		NBT	0	0		0		
NBR	0	0	0		0		NBR	0	0		0		
SBL	2	3400	920	.27*	1030	.30*	SBL	2	3400	920	.27*	1030	.30*
SBT	0	0	0		0		SBT	0	0		0		
SBR	1	1700	190	.11	270	.16	SBR	1	1700	190	.11	286	.17
EBL	1	1700	100	.06*	500	.29*	EBL	1	1700	118	.07*	503	.30*
EBT	2	3400	100	.03	210	.06	EBT	2	3400	143	.04	217	.06
EBR	0	0	0		0		EBR	0	0		0		
WBL	0	0	0		0		WBL	0	0		0		
WBT	2	3400	480	.14*	460	.14*	WBT	2	3400	480	.14*	491	.14*
WBR	1	1700	530	.31	690	.41	WBR	1	1700	530	.31	690	.41
Right Turn Adjustment			WBR	.03*	WBR	.12*	Right Turn Adjustment			WBR	.03*	WBR	.12*
Clearance Interval				.05*		.05*	Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION			.55			.90	TOTAL CAPACITY UTILIZATION			.56		.91	

18. I-405 SB Ramps & Center Ave

2030 With Prop. GPA Option 2 & Ripcurl							2030 With Alt. GPA & Ripcurl									
	LANES	CAPACITY	AM VOL	PK V/C	HOUR	PM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR	PM VOL	PK V/C
NBL	0	0	0		0				NBL	0	0	0		0		
NBT	0	0	0		0				NBT	0	0	0		0		
NBR	0	0	0		0				NBR	0	0	0		0		
SBL	2	3400	920	.27*	1030	.30*			SBL	2	3400	920	.27*	1030	.30*	
SBT	0	0	0		0				SBT	0	0	0		0		
SBR	1	1700	195	.11	283	.17			SBR	1	1700	186	.11	271	.16	
EBL	1	1700	122	.07*	499	.29*			EBL	1	1700	120	.07*	494	.29*	
EBT	2	3400	159	.05	201	.06			EBT	2	3400	149	.04	182	.05	
EBR	0	0	0		0				EBR	0	0	0		0		
WBL	0	0	0		0				WBL	0	0	0		0		
WBT	2	3400	486	.14*	487	.14*			WBT	2	3400	475	.14*	474	.14*	
WBR	1	1700	530	.31	690	.41			WBR	1	1700	530	.31	690	.41	
Right Turn Adjustment		WBR	.03*		WBR	.12*			Right Turn Adjustment		WBR	.03*		WBR	.12*	
Clearance Interval			.05*			.05*			Clearance Interval			.05*			.05*	
TOTAL CAPACITY UTILIZATION			.56			.90			TOTAL CAPACITY UTILIZATION			.56			.90	

18. I-405 SB Ramps & Center Ave

Year 2030 With-Mitigation						
	LANES	CAPACITY	AM PK VOL	HOUR V/C	PM PK VOL	HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	920	.27*	1030	.30*
SBT	0	0	0		0	
SBR	1	1700	190	.11	286	.17
EBL	1	1700	118	.07*	503	.30*
EBT	2	3400	143	.04	217	.06
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	480	.14*	491	.14*
WBR	1	1700	530	.31	690	.41
Clearance Interval			.05*		.05*	
Note: Assumes Right-Turn Overlap for WBR						
TOTAL CAPACITY UTILIZATION			.53		.79	

**19. Beach Blvd & Center Ave**

Year 2014 No-Project								Year 2014 With-Project									
	LANES	CAPACITY	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	
NBL	0	0	0		0	NBL	0	0	0		0	NBL	0	0	0		
NBT	4	6800	2460	.36	2900	NBT	4	6800	2460	.36	2900	NBT	4	6800	2460	.43*	
NBR	0	0	0		0	NBR	0	0	0		0	NBR	0	0	0		
SBL	0	0	0		0	SBL	0	0	0		0	SBL	0	0	0		
SBT	4	6800	2690	.40*	2190	SBT	4	6800	2690	.40*	2190	SBT	4	6800	2690	.32	
SBR	f		650		910	SBR	f		650		941	SBR	f		650		
EBL	2	3400	80	.02*	170	EBL	2	3400	112	.03*	175	EBL	2	3400	112	.05*	
EBT	0	0	0		0	EBT	0	0	0		0	EBT	0	0	0		
EBR	2	3400	870	.26	980	EBR	2	3400	881	.26	982	EBR	2	3400	881	.29	
WBL	0	0	0		0	WBL	0	0	0		0	WBL	0	0	0		
WBT	0	0	0		0	WBT	0	0	0		0	WBT	0	0	0		
WBR	0	0	0		0	WBR	0	0	0		0	WBR	0	0	0		
Right Turn Adjustment		EBR	.24*		EBR	.18*	Right Turn Adjustment		EBR	.23*		EBR	.18*	Right Turn Adjustment		EBR	.18*
Clearance Interval			.05*			.05*	Clearance Interval			.05*			.05*	Clearance Interval			.05*
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.71</b>			<b>.71</b>	<b>TOTAL CAPACITY UTILIZATION</b>			<b>.71</b>			<b>.71</b>				

Year 2030 No-Project								Year 2030 With-Project									
	LANES	CAPACITY	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	
NBL	0	0	0		0	NBL	0	0	0		0	NBL	0	0	0		
NBT	4	6800	2770	.41	3270	NBT	4	6800	2770	.41	3270	NBT	4	6800	2770	.48*	
NBR	0	0	0		0	NBR	0	0	0		0	NBR	0	0	0		
SBL	0	0	0		0	SBL	0	0	0		0	SBL	0	0	0		
SBT	4	6800	3020	.44*	2420	SBT	4	6800	3020	.44*	2420	SBT	4	6800	3020	.36	
SBR	f		960		1110	SBR	f		960		1141	SBR	f		960		1141
EBL	2	3400	90	.03*	180	EBL	2	3400	122	.04*	185	EBL	2	3400	122	.05*	
EBT	0	0	0		0	EBT	0	0	0		0	EBT	0	0	0		
EBR	2	3400	970	.29	1030	EBR	2	3400	981	.29	1032	EBR	2	3400	981	.30	
WBL	0	0	0		0	WBL	0	0	0		0	WBL	0	0	0		
WBT	0	0	0		0	WBT	0	0	0		0	WBT	0	0	0		
WBR	0	0	0		0	WBR	0	0	0		0	WBR	0	0	0		
Right Turn Adjustment		EBR	.26*		EBR	.19*	Right Turn Adjustment		EBR	.25*		EBR	.19*	Right Turn Adjustment		EBR	.19*
Clearance Interval			.05*			.05*	Clearance Interval			.05*			.05*	Clearance Interval			.05*
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.78</b>			<b>.77</b>	<b>TOTAL CAPACITY UTILIZATION</b>			<b>.78</b>			<b>.77</b>				

26. Goldenwest St & Edinger Ave

Year 2014 No-Project						Year 2014 With-Project							
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR		
NBL	1	1700	140	.08	.160	.09	NBL	1	1700	140	.08	.160	.09
NBT	3	5100	1170	.23*	1160	.23*	NBT	3	5100	1170	.23*	1160	.23*
NBR	d	1700	120	.07	80	.05	NBR	d	1700	120	.07	83	.05
SBL	1	1700	190	.11*	210	.12*	SBL	1	1700	190	.11*	210	.12*
SBT	3	5100	1190	.23	1090	.21	SBT	3	5100	1190	.23	1090	.21
SBR	d	1700	110	.06	110	.06	SBR	d	1700	110	.06	110	.06
EBL	1	1700	150	.09	140	.08*	EBL	1	1700	150	.09	140	.08*
EBT	3	5100	1000	.20*	730	.14	EBT	3	5100	1000	.20*	734	.14
EBR	d	1700	110	.06	160	.09	EBR	d	1700	110	.06	160	.09
WBL	1	1700	60	.04*	140	.08	WBL	1	1700	64	.04*	141	.08
WBT	3	5100	540	.11	770	.15*	WBT	3	5100	545	.11	771	.15*
WBR	d	1700	100	.06	260	.15	WBR	d	1700	102	.06	260	.15
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*	
TOTAL CAPACITY UTILIZATION			.63		.63		TOTAL CAPACITY UTILIZATION			.63		.63	

Year 2030 No-Project						Year 2030 With-Project							
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR		
NBL	1	1700	160	.09	170	.10	NBL	1	1700	160	.09	170	.10
NBT	3	5100	1270	.25*	1230	.24*	NBT	3	5100	1270	.25*	1230	.24*
NBR	d	1700	160	.09	90	.05	NBR	d	1700	160	.09	93	.05
SBL	1	1700	200	.12*	220	.13*	SBL	1	1700	200	.12*	220	.13*
SBT	3	5100	1390	.27	1150	.23	SBT	3	5100	1390	.27	1150	.23
SBR	d	1700	120	.07	130	.08	SBR	d	1700	120	.07	130	.08
EBL	1	1700	150	.09	190	.11*	EBL	1	1700	150	.09	190	.11*
EBT	3	5100	1010	.20*	870	.17	EBT	3	5100	1010	.20*	874	.17
EBR	d	1700	120	.07	170	.10	EBR	d	1700	120	.07	170	.10
WBL	1	1700	70	.04*	150	.09	WBL	1	1700	74	.04*	151	.09
WBT	3	5100	680	.13	890	.17*	WBT	3	5100	685	.13	891	.17*
WBR	d	1700	130	.08	330	.19	WBR	d	1700	132	.08	330	.19
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*	
TOTAL CAPACITY UTILIZATION			.66		.70		TOTAL CAPACITY UTILIZATION			.66		.70	

**27. Gothard St & Edinger Ave**

Year 2014 No-Project						Year 2014 With-Project									
	LANES	CAPACITY	AM PK HOUR		V/C	PM PK HOUR		V/C	LANES	CAPACITY	AM PK HOUR		PM PK HOUR		
			VOL	V/C		VOL	V/C				VOL	V/C	VOL	V/C	
NBL	1	1700	120	.07*		140	.08		NBL	1	1700	120	.07*	140	.08
NBT	2	3400	470	.14		630	.19*		NBT	2	3400	470	.14	646	.19*
NBR	d	1700	90	.05		230	.14		NBR	d	1700	90	.05	230	.14
SBL	1	1700	50	.03		70	.04*		SBL	1	1700	54	.03	71	.04*
SBT	2	3400	330	.10*		460	.14		SBT	2	3400	350	.10*	463	.14
SBR	d	1700	100	.06		170	.10		SBR	d	1700	111	.07	172	.10
EBL	1	1700	90	.05*		80	.05*		EBL	1	1700	90	.05*	89	.05*
EBT	3	5100	960	.19		1070	.21		EBT	3	5100	960	.19	1070	.21
EBR	d	1700	110	.06		120	.07		EBR	d	1700	110	.06	120	.07
WBL	1	1700	90	.05		140	.08		WBL	1	1700	90	.05	140	.08
WBT	3	5100	1010	.22*		1180	.25*		WBT	3	5100	1010	.22*	1180	.25*
WBR	0	0	90			110			WBR	0	0	90			118
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*			
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.49</b>		<b>.58</b>		<b>TOTAL CAPACITY UTILIZATION</b>			<b>.49</b>		<b>.58</b>			

Year 2030 No-Project						Year 2030 With-Project									
	LANES	CAPACITY	AM PK HOUR		V/C	PM PK HOUR		V/C	LANES	CAPACITY	AM PK HOUR		PM PK HOUR		
			VOL	V/C		VOL	V/C				VOL	V/C	VOL	V/C	
NBL	1	1700	120	.07		170	.10*		NBL	1	1700	120	.07*	170	.10*
NBT	2	3400	550	.16*		630	.19		NBT	2	3400	550	.16	646	.19
NBR	d	1700	90	.05		260	.15		NBR	d	1700	90	.05	260	.15
SBL	1	1700	70	.04*		80	.05		SBL	1	1700	74	.04	81	.05
SBT	2	3400	420	.12		520	.15*		SBT	2	3400	440	.13*	523	.15*
SBR	d	1700	130	.08		200	.12		SBR	d	1700	141	.08	202	.12
EBL	1	1700	100	.06*		90	.05		EBL	1	1700	100	.06*	99	.06*
EBT	3	5100	1090	.21		1150	.23*		EBT	3	5100	1090	.21	1150	.23
EBR	d	1700	120	.07		130	.08		EBR	d	1700	120	.07	130	.08
WBL	1	1700	100	.06		190	.11*		WBL	1	1700	100	.06	190	.11
WBT	3	5100	1130	.24*		1340	.29		WBT	3	5100	1130	.24*	1340	.29*
WBR	0	0	100			120			WBR	0	0	100			128
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*			
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.55</b>		<b>.64</b>		<b>TOTAL CAPACITY UTILIZATION</b>			<b>.55</b>		<b>.65</b>			

28. Beach Blvd & Edinger Ave

Year 2014 No-Project								Year 2014 With-Project								
	LANES	CAPACITY	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR		
NBL	2	3400	130	.04	560	.16						NBL	2	3400	130	.04
NBT	3	5100	1800	.35*	2400	.47*						NBT	3	5100	1800	.35*
NBR	1	1700	390	.23	580	.34						NBR	1	1700	390	.23
SBL	2	3400	540	.16*	380	.11*						SBL	2	3400	540	.16*
SBT	4	6800	2650	.39	2370	.35						SBT	4	6800	2650	.39
SBR	2	3400	340	.10	760	.22						SBR	2	3400	340	.10
EBL	2	3400	180	.05	390	.11*						EBL	2	3400	180	.05
EBT	3	5100	710	.14*	740	.15						EBT	3	5100	712	.14*
EBR	1	1700	120	.07	300	.18						EBR	1	1700	129	.08
WBL	2	3400	110	.03*	210	.06						WBL	2	3400	110	.03*
WBT	2	3400	400	.12	620	.18*						WBT	2	3400	400	.12
WBR	1	1700	310	.18	280	.16						WBR	1	1700	310	.18
Clearance Interval			.05*		.05*		Clearance Interval			.05*		Clearance Interval			.05*	
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.73</b>		<b>.92</b>		<b>TOTAL CAPACITY UTILIZATION</b>			<b>.73</b>		<b>TOTAL CAPACITY UTILIZATION</b>			<b>.92</b>	

Year 2030 No-Project								Year 2030 With-Project								
	LANES	CAPACITY	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR	AM VOL	PK V/C	HOUR		
NBL	2	3400	140	.04	570	.17						NBL	2	3400	140	.04
NBT	3	5100	2070	.41*	2670	.52*						NBT	3	5100	2070	.41*
NBR	1	1700	400	.24	630	.37						NBR	1	1700	400	.24
SBL	2	3400	670	.20*	440	.13*						SBL	2	3400	670	.20*
SBT	4	6800	2820	.41	2450	.36						SBT	4	6800	2820	.41
SBR	2	3400	440	.13	940	.28						SBR	2	3400	440	.13
EBL	2	3400	200	.06*	490	.14*						EBL	2	3400	200	.06*
EBT	3	5100	810	.16	810	.16						EBT	3	5100	812	.16
EBR	1	1700	120	.07	310	.18						EBR	1	1700	129	.08
WBL	2	3400	120	.04	220	.06						WBL	2	3400	120	.04
WBT	2	3400	460	.14*	710	.21*						WBT	2	3400	460	.14*
WBR	1	1700	320	.19	300	.18						WBR	1	1700	320	.19
Clearance Interval			.05*		.05*		Clearance Interval			.05*		Clearance Interval			.05*	
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.86</b>		<b>1.05</b>		<b>TOTAL CAPACITY UTILIZATION</b>			<b>.86</b>		<b>TOTAL CAPACITY UTILIZATION</b>			<b>1.05</b>	

29. Newland St & Edinger Ave

Year 2014 No-Project						Year 2014 With-Project					
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR
NBL	1	1700	190	.11*	.07	NBL	1	1700	190	.11*	.07
NBT	2	3400	410	.16	.25*	NBT	2	3400	410	.16	.25*
NBR	0	0	130		90	NBR	0	0	130		90
SBL	1	1700	170	.10	.08*	SBL	1	1700	170	.10	.08*
SBT	2	3400	670	.23*	.21	SBT	2	3400	670	.23*	.21
SBR	0	0	100		80	SBR	0	0	100		81
EBL	1	1700	50	.03	.06	EBL	1	1700	52	.03	.06
EBT	2	3400	850	.25*	.21*	EBT	2	3400	853	.25*	.21*
EBR	d	1700	100	.06	.05	EBR	d	1700	100	.06	.05
WBL	1	1700	200	.12*	.11*	WBL	1	1700	200	.12*	.11*
WBT	2	3400	700	.21	.22	WBT	2	3400	700	.21	.22
WBR	d	1700	80	.05	.11	WBR	d	1700	80	.05	.11
Clearance Interval			.05*		.05*	Clearance Interval			.05*		.05*
TOTAL CAPACITY UTILIZATION			.76		.70	TOTAL CAPACITY UTILIZATION			.76		.70

Year 2030 No-Project						Year 2030 With-Project					
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR
NBL	1	1700	200	.12*	.08	NBL	1	1700	200	.12*	.08
NBT	2	3400	420	.17	.29*	NBT	2	3400	420	.17	.29*
NBR	0	0	170		100	NBR	0	0	170		100
SBL	1	1700	180	.11	.11*	SBL	1	1700	180	.11	.11*
SBT	2	3400	960	.32*	.23	SBT	2	3400	960	.32*	.23
SBR	0	0	140		90	SBR	0	0	140		91
EBL	1	1700	90	.05	.07	EBL	1	1700	92	.05	.07
EBT	2	3400	880	.26*	.23*	EBT	2	3400	883	.26*	.23*
EBR	d	1700	110	.06	.06	EBR	d	1700	110	.06	.06
WBL	1	1700	210	.12*	.12*	WBL	1	1700	210	.12*	.12*
WBT	2	3400	780	.23	.25	WBT	2	3400	780	.23	.25
WBR	d	1700	80	.05	.12	WBR	d	1700	80	.05	.12
Clearance Interval			.05*		.05*	Clearance Interval			.05*		.05*
TOTAL CAPACITY UTILIZATION			.87		.80	TOTAL CAPACITY UTILIZATION			.87		.80

36. Gothard St & Heil Ave

Year 2014 No-Project						Year 2014 With-Project							
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR		
NBL	1	1700	140	.08*	280	.16*	NBL	1	1700	140	.08*	280	.16*
NBT	2	3400	610	.18	730	.21	NBT	2	3400	610	.18	740	.22
NBR	d	1700	140	.08	170	.10	NBR	d	1700	140	.08	170	.10
SBL	1	1700	40	.02	90	.05	SBL	1	1700	42	.02	90	.05
SBT	2	3400	540	.16*	580	.17*	SBT	2	3400	553	.16*	582	.17*
SBR	d	1700	40	.02	120	.07	SBR	d	1700	44	.03	121	.07
EBL	1	1700	120	.07	90	.05	EBL	1	1700	120	.07	93	.05
EBT	2	3400	720	.21*	600	.18*	EBT	2	3400	720	.21*	600	.18*
EBR	d	1700	180	.11	150	.09	EBR	d	1700	180	.11	150	.09
WBL	1	1700	180	.11*	180	.11*	WBL	1	1700	180	.11*	180	.11*
WBT	2	3400	430	.13	600	.18	WBT	2	3400	430	.13	600	.18
WBR	d	1700	30	.02	70	.04	WBR	d	1700	30	.02	72	.04
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*	
TOTAL CAPACITY UTILIZATION			.61		.67		TOTAL CAPACITY UTILIZATION			.61		.67	

Year 2030 No-Project						Year 2030 With-Project							
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR		
NBL	1	1700	160	.09*	290	.17*	NBL	1	1700	160	.09*	290	.17*
NBT	2	3400	710	.21	790	.23	NBT	2	3400	710	.21	800	.24
NBR	d	1700	200	.12	230	.14	NBR	d	1700	200	.12	230	.14
SBL	1	1700	50	.03	120	.07	SBL	1	1700	52	.03	120	.07
SBT	2	3400	590	.17*	640	.19*	SBT	2	3400	603	.18*	642	.19*
SBR	d	1700	50	.03	120	.07	SBR	d	1700	54	.03	121	.07
EBL	1	1700	130	.08	100	.06	EBL	1	1700	130	.08	103	.06
EBT	2	3400	830	.24*	760	.22*	EBT	2	3400	830	.24*	760	.22*
EBR	d	1700	190	.11	150	.09	EBR	d	1700	190	.11	150	.09
WBL	1	1700	300	.18*	260	.15*	WBL	1	1700	300	.18*	260	.15*
WBT	2	3400	510	.15	730	.21	WBT	2	3400	510	.15	730	.21
WBR	d	1700	40	.02	80	.05	WBR	d	1700	40	.02	82	.05
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*	
TOTAL CAPACITY UTILIZATION			.73		.78		TOTAL CAPACITY UTILIZATION			.74		.78	

**37. Beach Blvd & Heil Ave**

Year 2014 No-Project						Year 2014 With-Project									
	LANES	CAPACITY	AM PK HOUR		V/C	PM PK HOUR		V/C	LANES	CAPACITY	AM PK HOUR		PM PK HOUR		
			VOL	V/C		VOL	V/C				VOL	V/C	VOL	V/C	
NBL	1	1700	150	.09*		200	.12*		NBL	1	1700	150	.09*	200	.12*
NBT	4	6800	2190	.33		2630	.39		NBT	4	6800	2190	.33	2636	.39
NBR	0	0	20			40			NBR	0	0	20		40	
SBL	1	1700	70	.04		150	.09		SBL	1	1700	70	.04	150	.09
SBT	4	6800	2560	.41*		2560	.41*		SBT	4	6800	2568	.41*	2561	.41*
SBR	0	0	230			230			SBR	0	0	230		230	
EBL	1	1700	170	.10*		210	.12*		EBL	1	1700	170	.10*	210	.12*
EBT	2	3400	480	.14		350	.10		EBT	2	3400	480	.14	350	.10
EBR	d	1700	220	.13		180	.11		EBR	d	1700	220	.13	180	.11
WBL	1	1700	50	.03		50	.03		WBL	1	1700	50	.03	50	.03
WBT	2	3400	280	.11*		290	.12*		WBT	2	3400	280	.11*	290	.12*
WBR	0	0	80			110			WBR	0	0	80		110	
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*			
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.76</b>		<b>.82</b>		<b>TOTAL CAPACITY UTILIZATION</b>			<b>.76</b>		<b>.82</b>			

Year 2030 No-Project						Year 2030 With-Project						AM PK HOUR		PM PK HOUR	
	LANES	CAPACITY	AM PK HOUR		V/C	PM PK HOUR		V/C	LANES	CAPACITY	AM PK HOUR		PM PK HOUR		
			VOL	V/C		VOL	V/C				VOL	V/C	VOL	V/C	
NBL	1	1700	160	.09*		220	.13*		NBL	1	1700	160	.09*	220	.13*
NBT	4	6800	2460	.37		2770	.41		NBT	4	6800	2460	.37	2776	.41
NBR	0	0	30			40			NBR	0	0	30		40	
SBL	1	1700	80	.05		160	.09		SBL	1	1700	80	.05	160	.09
SBT	4	6800	2620	.44*		2630	.43*		SBT	4	6800	2628	.44*	2631	.43*
SBR	0	0	350			280			SBR	0	0	350		280	
EBL	1	1700	180	.11*		310	.18*		EBL	1	1700	180	.11*	310	.18*
EBT	2	3400	620	.18		480	.14		EBT	2	3400	620	.18	480	.14
EBR	d	1700	240	.14		190	.11		EBR	d	1700	240	.14	190	.11
WBL	1	1700	60	.04		60	.04		WBL	1	1700	60	.04	60	.04
WBT	2	3400	380	.14*		430	.16*		WBT	2	3400	380	.14*	430	.16*
WBR	0	0	90			120			WBR	0	0	90		120	
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*			
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.83</b>		<b>.95</b>		<b>TOTAL CAPACITY UTILIZATION</b>			<b>.83</b>		<b>.95</b>			

**46. Gothard St & Warner Ave**

Year 2014 No-Project						Year 2014 With-Project									
	LANES	CAPACITY	AM PK HOUR		V/C	PM PK HOUR		V/C	LANES	CAPACITY	AM PK HOUR		PM PK HOUR		
			VOL	V/C		VOL	V/C				VOL	V/C	VOL	V/C	
NBL	1	1700	130	.08		250	.15		NBL	1	1700	130	.08	250	.15
NBT	2	3400	440	.13*		760	.22*		NBT	2	3400	440	.13*	767	.23*
NBR	d	1700	50	.03		70	.04		NBR	d	1700	50	.03	70	.04
SBL	1	1700	130	.08*		150	.09*		SBL	1	1700	132	.08*	150	.09*
SBT	2	3400	400	.12		470	.14		SBT	2	3400	408	.12	471	.14
SBR	d	1700	50	.03		230	.14		SBR	d	1700	50	.03	230	.14
EBL	1	1700	180	.11		230	.14*		EBL	1	1700	180	.11	230	.14*
EBT	3	5100	1410	.28*		1110	.22		EBT	3	5100	1410	.28*	1110	.22
EBR	1	1700	210	.12		300	.18		EBR	1	1700	210	.12	300	.18
WBL	1	1700	80	.05*		80	.05		WBL	1	1700	80	.05*	80	.05
WBT	3	5100	740	.15		1500	.29*		WBT	3	5100	740	.15	1500	.29*
WBR	d	1700	130	.08		240	.14		WBR	d	1700	130	.08	242	.14
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*			
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.59</b>		<b>.79</b>		<b>TOTAL CAPACITY UTILIZATION</b>			<b>.59</b>		<b>.80</b>			

Year 2030 No-Project						Year 2030 With-Project						AM PK HOUR		PM PK HOUR	
	LANES	CAPACITY	AM PK HOUR		V/C	PM PK HOUR		V/C	LANES	CAPACITY	AM PK HOUR		PM PK HOUR		
			VOL	V/C		VOL	V/C				VOL	V/C	VOL	V/C	
NBL	1	1700	140	.08		260	.15		NBL	1	1700	140	.08	260	.15
NBT	2	3400	590	.17*		860	.25*		NBT	2	3400	590	.17*	867	.26*
NBR	d	1700	60	.04		80	.05		NBR	d	1700	60	.04	80	.05
SBL	1	1700	130	.08*		160	.09*		SBL	1	1700	132	.08*	160	.09*
SBT	2	3400	530	.16		480	.14		SBT	2	3400	538	.16	481	.14
SBR	d	1700	80	.05		350	.21		SBR	d	1700	80	.05	350	.21
EBL	1	1700	190	.11		240	.14*		EBL	1	1700	190	.11	240	.14*
EBT	3	5100	1510	.30*		1200	.24		EBT	3	5100	1510	.30*	1200	.24
EBR	1	1700	220	.13		310	.18		EBR	1	1700	220	.13	310	.18
WBL	1	1700	90	.05*		140	.08		WBL	1	1700	90	.05*	140	.08
WBT	3	5100	760	.15		1580	.31*		WBT	3	5100	760	.15	1580	.31*
WBR	d	1700	160	.09		260	.15		WBR	d	1700	160	.09	262	.15
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*			
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.65</b>		<b>.84</b>		<b>TOTAL CAPACITY UTILIZATION</b>			<b>.65</b>		<b>.85</b>			

**47. Beach Blvd & Warner Ave**

Year 2014 No-Project						Year 2014 With-Project							
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR		
NBL	2	3400	170	.05*	.11		NBL	2	3400	170	.05*	.11	
NBT	4	6800	1380	.22	.2370	.39*	NBT	4	6800	1380	.22	.2375	.39*
NBR	0	0	140		260		NBR	0	0	140		260	
SBL	2	3400	270	.08	.280	.08*	SBL	2	3400	270	.08	.280	.08*
SBT	4	6800	1830	.27*	.2070	.30	SBT	4	6800	1836	.27*	.2071	.30
SBR	1	1700	270	.16	490	.29	SBR	1	1700	270	.16	490	.29
EBL	2	3400	300	.09	430	.13*	EBL	2	3400	300	.09	430	.13*
EBT	3	5100	1160	.26*	1050	.25	EBT	3	5100	1160	.26*	1050	.25
EBR	0	0	160		250		EBR	0	0	160		250	
WBL	2	3400	300	.09*	300	.09	WBL	2	3400	300	.09*	300	.09
WBT	3	5100	720	.15	1130	.27*	WBT	3	5100	720	.15	1130	.27*
WBR	0	0	60		230		WBR	0	0	60		230	
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*	
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.72</b>		<b>.92</b>		<b>TOTAL CAPACITY UTILIZATION</b>			<b>.72</b>		<b>.92</b>	

Year 2030 No-Project						Year 2030 With-Project							
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR		
NBL	2	3400	220	.06	380	.11	NBL	2	3400	220	.06	380	.11
NBT	4	6800	1520	.26*	2450	.40*	NBT	4	6800	1520	.26*	2455	.40*
NBR	0	0	220		270		NBR	0	0	220		270	
SBL	2	3400	300	.09*	290	.09*	SBL	2	3400	300	.09*	290	.09*
SBT	4	6800	1840	.27	2110	.31	SBT	4	6800	1846	.27	2111	.31
SBR	1	1700	340	.20	520	.31	SBR	1	1700	340	.20	520	.31
EBL	2	3400	330	.10	440	.13*	EBL	2	3400	330	.10	440	.13*
EBT	3	5100	1160	.26*	1150	.28	EBT	3	5100	1160	.26*	1150	.28
EBR	0	0	170		260		EBR	0	0	170		260	
WBL	2	3400	410	.12*	320	.09	WBL	2	3400	410	.12*	320	.09
WBT	3	5100	750	.16	1190	.29*	WBT	3	5100	750	.16	1190	.29*
WBR	0	0	70		290		WBR	0	0	70		290	
Clearance Interval			.05*		.05*		Clearance Interval			.05*		.05*	
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.78</b>		<b>.96</b>		<b>TOTAL CAPACITY UTILIZATION</b>			<b>.78</b>		<b>.96</b>	

250. Beach Blvd & McFadden Ave

Year 2014 No-Project						Year 2014 With-Project					
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR
NBL	2	3400	190	.06*	.08	NBL	2	3400	190	.06*	.08
NBT	4	6800	2010	.32	.41*	NBT	4	6800	2021	.32	.41*
NBR	0	0	140		290	NBR	0	0	146		291
SBL	2	3400	210	.06	.07*	SBL	2	3400	210	.06	.07*
SBT	4	6800	2500	.41*	.36	SBT	4	6800	2500	.41*	.37
SBR	0	0	310		260	SBR	0	0	310		271
EBL	2	3400	270	.08*	.11*	EBL	2	3400	283	.08*	.11*
EBT	2	3400	410	.16	.18	EBT	2	3400	416	.16	.18
EBR	0	0	130		140	EBR	0	0	130		140
WBL	2	3400	380	.11	.12	WBL	2	3400	380	.11	.13
WBT	2	3400	520	.20*	.21*	WBT	2	3400	520	.20*	.21*
WBR	0	0	170		180	WBR	0	0	170		180
Clearance Interval			.05*		.05*	Clearance Interval			.05*		.05*
TOTAL CAPACITY UTILIZATION			.80		.85	TOTAL CAPACITY UTILIZATION			.80		.85

Year 2030 No-Project						Year 2030 With-Project					
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR
NBL	2	3400	200	.06*	.08	NBL	2	3400	200	.06*	.08
NBT	4	6800	2240	.36	.46*	NBT	4	6800	2251	.36	.46*
NBR	0	0	200		330	NBR	0	0	206		331
SBL	2	3400	240	.07	.08*	SBL	2	3400	240	.07	.08*
SBT	4	6800	2820	.47*	.42	SBT	4	6800	2820	.47*	.42
SBR	0	0	400		300	SBR	0	0	400		311
EBL	2	3400	280	.08	.12*	EBL	2	3400	293	.09	.12*
EBT	2	3400	500	.19*	.18	EBT	2	3400	506	.19*	.18
EBR	0	0	140		140	EBR	0	0	140		140
WBL	2	3400	460	.14*	.14	WBL	2	3400	460	.14*	.14
WBT	2	3400	530	.21	.24*	WBT	2	3400	530	.21	.24*
WBR	0	0	180		190	WBR	0	0	180		190
Clearance Interval			.05*		.05*	Clearance Interval			.05*		.05*
TOTAL CAPACITY UTILIZATION			.91		.95	TOTAL CAPACITY UTILIZATION			.91		.95

251. Beach Blvd & Bolsa Ave

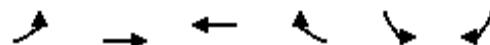
Year 2014 No-Project						Year 2014 With-Project					
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR
NBL	2	3400	270	.08*	.07	NBL	2	3400	270	.08*	.07
NBT	4	6800	2050	.30	.40*	NBT	4	6800	2067	.31	.40*
NBR	0	0	10		40	NBR	0	0	16		41
SBL	2	3400	150	.04	.07*	SBL	2	3400	150	.04	.07*
SBT	4	6800	2390	.38*	.37	SBT	4	6800	2390	.38*	.37
SBR	0	0	190		190	SBR	0	0	190		190
EBL	1	1700	190	.11*	.15*	EBL	1	1700	190	.11*	.15*
EBT	2	3400	520	.15	.18	EBT	2	3400	520	.15	.18
EBR	1	1700	510	.30	.23	EBR	1	1700	510	.30	.23
WBL	1	1700	130	.08	.09	WBL	1	1700	130	.08	.10
WBT	2	3400	580	.17*	.20*	WBT	2	3400	580	.17*	.20*
WBR	1	1700	180	.11	.15	WBR	1	1700	180	.11	.15
Right Turn Adjustment		EBR	.06*			Right Turn Adjustment		EBR	.06*		
Clearance Interval			.05*		.05*	Clearance Interval			.05*		.05*
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.85</b>		<b>.87</b>	<b>TOTAL CAPACITY UTILIZATION</b>			<b>.85</b>		<b>.87</b>

Year 2030 No-Project						Year 2030 With-Project					
	LANES	CAPACITY	AM VOL	PK V/C	HOUR		LANES	CAPACITY	AM VOL	PK V/C	HOUR
NBL	2	3400	280	.08*	.09	NBL	2	3400	280	.08*	.09
NBT	4	6800	2260	.33	.45*	NBT	4	6800	2277	.34	.45*
NBR	0	0	10		40	NBR	0	0	16		41
SBL	2	3400	160	.05	.07*	SBL	2	3400	160	.05	.07*
SBT	4	6800	2820	.46*	.42	SBT	4	6800	2820	.46*	.42
SBR	0	0	290		250	SBR	0	0	290		250
EBL	1	1700	230	.14*	.24*	EBL	1	1700	230	.14*	.24*
EBT	2	3400	620	.18	.20	EBT	2	3400	620	.18	.20
EBR	1	1700	560	.33	.27	EBR	1	1700	560	.33	.27
WBL	1	1700	140	.08	.11	WBL	1	1700	140	.08	.11
WBT	2	3400	610	.18*	.25*	WBT	2	3400	610	.18*	.25*
WBR	1	1700	190	.11	.15	WBR	1	1700	190	.11	.15
Right Turn Adjustment		EBR	.05*			Right Turn Adjustment		EBR	.05*		
Clearance Interval			.05*		.05*	Clearance Interval			.05*		.05*
<b>TOTAL CAPACITY UTILIZATION</b>			<b>.96</b>		<b>1.06</b>	<b>TOTAL CAPACITY UTILIZATION</b>			<b>.96</b>		<b>1.06</b>

# **Appendix B**

## **HCM INTERSECTION CALCULATIONS**

# **EXISTING**



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑	↑↑	↑↑	↑	↑↑	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Fr <sub>t</sub>	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	3433	1583
Volume (vph)	50	90	260	310	800	150
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	50	90	260	310	800	150
RTOR Reduction (vph)	0	0	0	136	0	109
Lane Group Flow (vph)	50	90	260	174	800	41
Turn Type	Prot			Perm		Perm
Protected Phases	1	6	2		8	
Permitted Phases				2		8
Actuated Green, G (s)	7.5	79.0	67.5	67.5	33.0	33.0
Effective Green, g (s)	7.5	79.0	67.5	67.5	33.0	33.0
Actuated g/C Ratio	0.06	0.66	0.56	0.56	0.28	0.28
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	111	2330	1991	890	944	435
v/s Ratio Prot	c0.03	0.03	0.07		c0.23	
v/s Ratio Perm				c0.11		0.03
v/c Ratio	0.45	0.04	0.13	0.20	0.85	0.09
Uniform Delay, d <sub>1</sub>	54.3	7.2	12.4	12.9	41.1	32.4
Progression Factor	1.00	1.00	0.77	0.42	1.00	1.00
Incremental Delay, d <sub>2</sub>	2.9	0.0	0.1	0.5	7.1	0.1
Delay (s)	57.2	7.2	9.6	5.9	48.3	32.5
Level of Service	E	A	A	A	D	C
Approach Delay (s)		25.1	7.6		45.8	
Approach LOS		C	A		D	

#### Intersection Summary

HCM Average Control Delay	30.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.88		0.86	0.86	1.00
Fr <sub>t</sub>	1.00	0.85		1.00	1.00	0.85
Flt Protected	0.95	1.00		1.00	1.00	1.00
Satd. Flow (prot)	3433	2787		6408	6408	1583
Flt Permitted	0.95	1.00		1.00	1.00	1.00
Satd. Flow (perm)	3433	2787		6408	6408	1583
Volume (vph)	80	830	0	2210	2550	520
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	80	830	0	2210	2550	520
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	80	829	0	2210	2550	520
Turn Type		Perm			Free	
Protected Phases	4			2	6	
Permitted Phases		4			Free	
Actuated Green, G (s)	52.0	52.0		60.0	60.0	120.0
Effective Green, g (s)	52.0	52.0		60.0	60.0	120.0
Actuated g/C Ratio	0.43	0.43		0.50	0.50	1.00
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	1488	1208		3204	3204	1583
v/s Ratio Prot	0.02			0.34	c0.40	
v/s Ratio Perm		c0.30			0.33	
v/c Ratio	0.05	0.69		0.69	0.80	0.33
Uniform Delay, d <sub>1</sub>	19.7	27.4		22.9	24.9	0.0
Progression Factor	0.21	0.20		0.27	0.55	1.00
Incremental Delay, d <sub>2</sub>	0.0	1.1		0.7	1.4	0.4
Delay (s)	4.2	6.5		6.9	15.1	0.4
Level of Service	A	A		A	B	A
Approach Delay (s)	6.3			6.9	12.6	
Approach LOS	A			A	B	

#### Intersection Summary

HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Analysis Period (min)	15		
c Critical Lane Group			

## Existing - AM Peak Hour

28: Edinger &amp; Beach

Synchro 6 Report [B614]

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑↑	↑	↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑↑	↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	*0.30	1.00	1.00	0.95	1.00	0.97	*0.70	1.00	*1.00	0.86	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1676	1583	1770	3539	1583	3433	3912	1583	3539	6408	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1676	1583	1770	3539	1583	3433	3912	1583	3539	6408	2787
Volume (vph)	170	670	120	100	370	300	130	1690	390	490	2570	300
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	170	670	120	100	370	300	130	1690	390	490	2570	300
RTOR Reduction (vph)	0	0	44	0	0	171	0	0	109	0	0	133
Lane Group Flow (vph)	170	670	76	100	370	129	130	1690	281	490	2570	167
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	19.6	31.0	31.0	7.0	18.4	18.4	8.0	50.0	50.0	16.0	58.0	58.0
Effective Green, g (s)	19.6	31.0	31.0	7.0	18.4	18.4	8.0	50.0	50.0	16.0	58.0	58.0
Actuated g/C Ratio	0.16	0.26	0.26	0.06	0.15	0.15	0.07	0.42	0.42	0.13	0.48	0.48
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	561	433	409	103	543	243	229	1630	660	472	3097	1347
v/s Ratio Prot	0.05	c0.40		c0.06	0.10		0.04	c0.43		c0.14	0.40	
v/s Ratio Perm			0.05			0.08			0.18			0.06
v/c Ratio	0.30	1.55	0.19	0.97	0.68	0.53	0.57	1.04	0.43	1.04	0.83	0.12
Uniform Delay, d1	44.2	44.5	34.7	56.4	48.0	46.8	54.3	35.0	24.8	52.0	26.7	17.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.46	0.31	0.78	0.43	0.07
Incremental Delay, d2	0.3	257.5	1.0	79.0	3.5	2.2	2.5	30.0	1.6	43.3	1.8	0.1
Delay (s)	44.5	302.0	35.7	135.4	51.5	49.0	35.1	46.3	9.3	84.0	13.3	1.3
Level of Service	D	F	D	F	D	D	D	D	A	F	B	A
Approach Delay (s)		223.1			61.5			39.1			22.5	
Approach LOS		F			E			D			C	

## Intersection Summary

HCM Average Control Delay	58.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.86		1.00	0.86	
Fr <sub>t</sub>	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	6399		1770	6344	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1770	6399		1770	6344	
Volume (vph)	90	900	100	50	240	80	150	2080	20	70	2540	180
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	90	900	100	50	240	80	150	2080	20	70	2540	180
RTOR Reduction (vph)	0	0	70	0	0	63	0	1	0	0	9	0
Lane Group Flow (vph)	90	900	30	50	240	17	150	2099	0	70	2711	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Prot			
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	10.4	32.0	32.0	4.0	25.6	25.6	11.9	60.3		7.7	56.1	
Effective Green, g (s)	10.4	32.0	32.0	4.0	25.6	25.6	11.9	60.3		7.7	56.1	
Actuated g/C Ratio	0.09	0.27	0.27	0.03	0.21	0.21	0.10	0.50		0.06	0.47	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	153	944	422	59	397	338	176	3215		114	2966	
v/s Ratio Prot	0.05	c0.25		c0.03	0.13		c0.08	0.33		0.04	c0.43	
v/s Ratio Perm			0.02			0.01						
v/c Ratio	0.59	0.95	0.07	0.85	0.60	0.05	0.85	0.65		0.61	0.91	
Uniform Delay, d1	52.7	43.3	32.9	57.7	42.6	37.5	53.2	22.1		54.7	29.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.58	0.09		1.33	0.31	
Incremental Delay, d2	5.7	18.9	0.1	64.8	2.6	0.1	18.1	0.5		5.4	3.3	
Delay (s)	58.4	62.1	33.0	122.5	45.2	37.6	102.3	2.5		78.2	12.6	
Level of Service	E	E	C	F	D	D	F	A		E	B	
Approach Delay (s)		59.2			54.0			9.2			14.2	
Approach LOS		E			D			A			B	

## Intersection Summary

HCM Average Control Delay	22.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Analysis Period (min)	15		
c Critical Lane Group			

Existing - AM Peak Hour  
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Synchro 6 Report [B614]

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	1.00	0.86	1.00	0.86	1.00	1.00
Fr <sub>t</sub>	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1770	6389	1770	6408	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1770	6389	1770	6408	1583	
Volume (vph)	290	1160	160	250	700	60	130	2000	40	260	1830	240
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	290	1160	160	250	700	60	130	2000	40	260	1830	240
RTOR Reduction (vph)	0	0	120	0	0	48	0	2	0	0	0	144
Lane Group Flow (vph)	290	1160	40	250	700	12	130	2038	0	260	1830	96
Turn Type	Prot		Perm	Prot		Perm	Prot		Prot		Perm	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8					6	
Actuated Green, G (s)	16.0	30.0	30.0	10.0	24.0	24.0	16.0	43.0		21.0	48.0	48.0
Effective Green, g (s)	16.0	30.0	30.0	10.0	24.0	24.0	16.0	43.0		21.0	48.0	48.0
Actuated g/C Ratio	0.13	0.25	0.25	0.08	0.20	0.20	0.13	0.36		0.18	0.40	0.40
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Grp Cap (vph)	458	1271	396	286	1017	317	236	2289		310	2563	633
v/s Ratio Prot	0.08	c0.23		c0.07	0.14		0.07	c0.32		c0.15	0.29	
v/s Ratio Perm			0.03			0.01					0.06	
v/c Ratio	0.63	0.91	0.10	0.87	0.69	0.04	0.55	0.89		0.84	0.71	0.15
Uniform Delay, d1	49.2	43.7	34.6	54.4	44.5	38.7	48.6	36.3		47.9	30.2	23.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.11	1.37	4.69
Incremental Delay, d2	6.5	11.5	0.5	28.9	3.8	0.2	9.0	5.7		12.0	0.8	0.2
Delay (s)	55.7	55.2	35.1	83.3	48.3	38.9	57.6	42.0		65.0	42.2	108.1
Level of Service	E	E	D	F	D	D	E	D		E	D	F
Approach Delay (s)		53.3			56.4			42.9			51.5	
Approach LOS		D			E			D			D	

**Intersection Summary**

HCM Average Control Delay	50.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑		↑↑	↑↑		↑↑	↑↑↑↑		↑↑	↑↑↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.86		0.97	0.86	
Frt	1.00	0.96		1.00	0.96		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3401		3433	3408		3433	6348		3433	6309	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3401		3433	3408		3433	6348		3433	6309	
Volume (vph)	270	370	130	350	520	170	190	1800	120	200	2360	270
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	270	370	130	350	520	170	190	1800	120	200	2360	270
RTOR Reduction (vph)	0	30	0	0	27	0	0	8	0	0	16	0
Lane Group Flow (vph)	270	470	0	350	663	0	190	1912	0	200	2614	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	11.8	23.2		14.7	26.1		9.0	54.9		11.2	57.1	
Effective Green, g (s)	11.8	23.2		14.7	26.1		9.0	54.9		11.2	57.1	
Actuated g/C Ratio	0.10	0.19		0.12	0.22		0.08	0.46		0.09	0.48	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	338	658		421	741		257	2904		320	3002	
v/s Ratio Prot	0.08	0.14		c0.10	c0.19		c0.06	0.30		0.06	c0.41	
v/s Ratio Perm												
v/c Ratio	0.80	0.71		0.83	0.90		0.74	0.66		0.62	0.87	
Uniform Delay, d1	52.9	45.3		51.4	45.6		54.4	25.3		52.4	28.1	
Progression Factor	1.00	1.00		1.00	1.00		0.82	1.36		1.34	0.32	
Incremental Delay, d2	12.4	3.7		13.1	13.3		8.5	0.9		1.7	1.8	
Delay (s)	65.3	49.0		64.5	59.0		53.1	35.4		72.0	10.9	
Level of Service	E	D		E	E		D	D		E	B	
Approach Delay (s)		54.7			60.8			37.0			15.2	
Approach LOS		D			E			D			B	

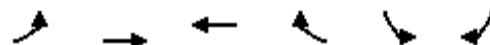
#### Intersection Summary

HCM Average Control Delay	33.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.86		0.97	0.86	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	6403		3433	6347	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	6403		3433	6347	
Volume (vph)	170	480	490	130	560	180	270	1960	10	150	2210	150
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	170	480	490	130	560	180	270	1960	10	150	2210	150
RTOR Reduction (vph)	0	0	127	0	0	134	0	1	0	0	8	0
Lane Group Flow (vph)	170	480	363	130	560	46	270	1969	0	150	2352	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Prot			
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	14.2	30.2	30.2	10.8	26.8	26.8	11.7	54.2		8.8	51.3	
Effective Green, g (s)	14.2	30.2	30.2	10.8	26.8	26.8	11.7	54.2		8.8	51.3	
Actuated g/C Ratio	0.12	0.25	0.25	0.09	0.22	0.22	0.10	0.45		0.07	0.43	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	209	891	398	159	790	354	335	2892		252	2713	
v/s Ratio Prot	c0.10	0.14		0.07	0.16		c0.08	c0.31		0.04	c0.37	
v/s Ratio Perm			c0.23			0.03						
v/c Ratio	0.81	0.54	0.91	0.82	0.71	0.13	0.81	0.68		0.60	0.87	
Uniform Delay, d1	51.6	38.9	43.6	53.6	43.0	37.3	53.0	26.1		53.9	31.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	0.82		1.00	1.00	
Incremental Delay, d2	20.9	0.6	24.6	26.7	2.9	0.2	9.7	0.9		3.7	4.0	
Delay (s)	72.5	39.5	68.2	80.3	45.9	37.4	67.7	22.3		57.6	35.3	
Level of Service	E	D	E	F	D	D	E	C		E	D	
Approach Delay (s)		56.8			49.3			27.8			36.6	
Approach LOS		E			D			C			D	

#### Intersection Summary

HCM Average Control Delay	38.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑	↑↑	↑↑	↑	↑↑	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Fr <sub>t</sub>	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	3433	1583
Volume (vph)	350	210	240	610	930	200
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	350	210	240	610	930	200
RTOR Reduction (vph)	0	0	0	387	0	139
Lane Group Flow (vph)	350	210	240	223	930	61
Turn Type	Prot			Perm		Perm
Protected Phases	1	6	2		8	
Permitted Phases				2		8
Actuated Green, G (s)	27.3	75.2	43.9	43.9	36.8	36.8
Effective Green, g (s)	27.3	75.2	43.9	43.9	36.8	36.8
Actuated g/C Ratio	0.23	0.63	0.37	0.37	0.31	0.31
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	403	2218	1295	579	1053	485
v/s Ratio Prot	c0.20	0.06	0.07		c0.27	
v/s Ratio Perm				c0.14		0.04
v/c Ratio	0.87	0.09	0.19	0.39	0.88	0.13
Uniform Delay, d <sub>1</sub>	44.6	8.9	25.9	28.1	39.6	30.0
Progression Factor	1.00	1.00	0.72	0.49	1.00	1.00
Incremental Delay, d <sub>2</sub>	17.6	0.1	0.3	1.7	8.9	0.1
Delay (s)	62.3	9.0	19.0	15.5	48.5	30.1
Level of Service	E	A	B	B	D	C
Approach Delay (s)		42.3	16.5		45.2	
Approach LOS		D	B		D	

#### Intersection Summary

HCM Average Control Delay	35.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.88		0.86	0.86	1.00
Fr <sub>t</sub>	1.00	0.85		1.00	1.00	0.85
Flt Protected	0.95	1.00		1.00	1.00	1.00
Satd. Flow (prot)	3433	2787		6408	6408	1583
Flt Permitted	0.95	1.00		1.00	1.00	1.00
Satd. Flow (perm)	3433	2787		6408	6408	1583
Volume (vph)	160	960	0	3160	2420	820
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	160	960	0	3160	2420	820
RTOR Reduction (vph)	0	3	0	0	0	0
Lane Group Flow (vph)	160	957	0	3160	2420	820
Turn Type		Perm			Free	
Protected Phases	4			2	6	
Permitted Phases		4			Free	
Actuated Green, G (s)	44.4	44.4		67.6	67.6	120.0
Effective Green, g (s)	44.4	44.4		67.6	67.6	120.0
Actuated g/C Ratio	0.37	0.37		0.56	0.56	1.00
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	1270	1031		3610	3610	1583
v/s Ratio Prot	0.05		c0.49	0.38		
v/s Ratio Perm		c0.34			0.52	
v/c Ratio	0.13	0.93		0.88	0.67	0.52
Uniform Delay, d1	25.0	36.3		22.6	18.4	0.0
Progression Factor	0.55	0.82		0.54	1.24	1.00
Incremental Delay, d2	0.0	9.9		0.8	0.8	1.0
Delay (s)	13.8	39.6		13.1	23.5	1.0
Level of Service	B	D		B	C	A
Approach Delay (s)	35.9			13.1	17.8	
Approach LOS	D			B	B	

#### Intersection Summary

HCM Average Control Delay	18.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑↑	↑	↑	↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑↑	↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	*0.95	1.00	1.00	0.95	1.00	0.97	*0.70	1.00	*1.00	0.86	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5309	1583	1770	3539	1583	3433	3912	1583	3539	6408	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5309	1583	1770	3539	1583	3433	3912	1583	3539	6408	2787
Volume (vph)	350	710	290	200	580	270	550	2290	560	360	2340	680
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	350	710	290	200	580	270	550	2290	560	360	2340	680
RTOR Reduction (vph)	0	0	249	0	0	138	0	0	170	0	0	282
Lane Group Flow (vph)	350	710	41	200	580	132	550	2290	390	360	2340	398
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	12.0	17.0	17.0	13.0	18.0	18.0	22.0	62.0	62.0	12.0	52.0	52.0
Effective Green, g (s)	12.0	17.0	17.0	13.0	18.0	18.0	22.0	62.0	62.0	12.0	52.0	52.0
Actuated g/C Ratio	0.10	0.14	0.14	0.11	0.15	0.15	0.18	0.52	0.52	0.10	0.43	0.43
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	343	752	224	192	531	237	629	2021	818	354	2777	1208
v/s Ratio Prot	0.10	c0.13		0.11	c0.16		0.16	c0.59		c0.10	0.37	
v/s Ratio Perm			0.03			0.08			0.25			0.14
v/c Ratio	1.02	0.94	0.18	1.04	1.09	0.56	0.87	1.13	0.48	1.02	0.84	0.33
Uniform Delay, d1	54.0	51.0	45.4	53.5	51.0	47.3	47.7	29.0	18.6	54.0	30.3	22.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.58	0.31	0.02	1.13	0.91	1.39
Incremental Delay, d2	53.9	20.3	0.4	76.3	66.6	2.8	9.9	65.1	1.5	42.9	2.2	0.5
Delay (s)	107.9	71.3	45.8	129.8	117.6	50.2	37.7	74.1	1.9	103.9	29.9	31.6
Level of Service	F	E	D	F	F	D	D	E	A	F	C	C
Approach Delay (s)		75.3			102.6			56.3			38.1	
Approach LOS		E			F			E			D	

#### Intersection Summary

HCM Average Control Delay	57.7	HCM Level of Service	E
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.86		1.00	0.86	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	6393		1770	6334	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1770	6393		1770	6334	
Volume (vph)	170	300	170	50	230	110	190	2570	40	150	2530	210
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	170	300	170	50	230	110	190	2570	40	150	2530	210
RTOR Reduction (vph)	0	0	134	0	0	94	0	2	0	0	10	0
Lane Group Flow (vph)	170	300	36	50	230	16	190	2608	0	150	2730	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Prot			
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	14.4	25.3	25.3	6.3	17.2	17.2	14.7	59.7		12.7	57.7	
Effective Green, g (s)	14.4	25.3	25.3	6.3	17.2	17.2	14.7	59.7		12.7	57.7	
Actuated g/C Ratio	0.12	0.21	0.21	0.05	0.14	0.14	0.12	0.50		0.11	0.48	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	212	746	334	93	267	227	217	3181		187	3046	
v/s Ratio Prot	c0.10	0.08		0.03	c0.12		c0.11	0.41		0.08	c0.43	
v/s Ratio Perm			0.02			0.01						
v/c Ratio	0.80	0.40	0.11	0.54	0.86	0.07	0.88	0.82		0.80	0.90	
Uniform Delay, d1	51.4	40.8	38.2	55.4	50.2	44.5	51.8	25.6		52.4	28.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.81	0.14		0.82	0.16	
Incremental Delay, d2	19.2	0.4	0.1	5.9	23.6	0.1	14.0	1.0		12.8	2.7	
Delay (s)	70.6	41.2	38.4	61.3	73.8	44.6	55.7	4.6		55.7	7.2	
Level of Service	E	D	D	E	E	D	E	A		E	A	
Approach Delay (s)		48.3			64.0			8.1			9.7	
Approach LOS		D			E			A			A	

## Intersection Summary

HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑↑	↑	↑↑	↑↑↑	↑	↑↑	↑↑↑	↑↑	↑↑	↑↑↑	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.86	0.97	0.86	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	6311	3433	6408	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	6311	3433	6408	1583	
Volume (vph)	430	1000	250	290	1100	200	350	2330	260	270	2050	470
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	430	1000	250	290	1100	200	350	2330	260	270	2050	470
RTOR Reduction (vph)	0	0	180	0	0	119	0	16	0	0	0	204
Lane Group Flow (vph)	430	1000	70	290	1100	81	350	2574	0	270	2050	267
Turn Type	Prot		Perm	Prot		Perm	Prot		Prot		Perm	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8					6	
Actuated Green, G (s)	16.0	30.0	30.0	13.0	27.0	27.0	15.0	51.0		10.0	46.0	46.0
Effective Green, g (s)	16.0	30.0	30.0	13.0	27.0	27.0	15.0	51.0		10.0	46.0	46.0
Actuated g/C Ratio	0.13	0.25	0.25	0.11	0.22	0.22	0.12	0.42		0.08	0.38	0.38
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Grp Cap (vph)	458	1271	396	372	1144	356	429	2682		286	2456	607
v/s Ratio Prot	c0.13	0.20		0.08	c0.22		0.10	c0.41		0.08	c0.32	
v/s Ratio Perm			0.04			0.05						0.17
v/c Ratio	0.94	0.79	0.18	0.78	0.96	0.23	0.82	0.96		0.94	0.83	0.44
Uniform Delay, d1	51.5	42.0	35.3	52.1	46.0	38.0	51.2	33.5		54.7	33.6	27.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.63	0.43	0.14
Incremental Delay, d2	29.3	5.0	1.0	14.9	18.8	1.5	15.6	10.2		27.0	1.9	1.2
Delay (s)	80.8	47.0	36.3	67.0	64.8	39.5	66.8	43.7		61.6	16.3	4.9
Level of Service	F	D	D	E	E	D	E	D		E	B	A
Approach Delay (s)		54.0			62.0			46.5			18.8	
Approach LOS		D			E			D			B	

Intersection Summary

HCM Average Control Delay	42.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑		↑↑	↑↑		↑↑	↑↑↑↑		↑↑	↑↑↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.86		0.97	0.86	
Fr <sub>t</sub>	1.00	0.96		1.00	0.96		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3415		3433	3397		3433	6308		3433	6309	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3415		3433	3397		3433	6308		3433	6309	
Volume (vph)	360	460	140	390	490	180	270	2330	270	240	2090	240
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	360	460	140	390	490	180	270	2330	270	240	2090	240
RTOR Reduction (vph)	0	24	0	0	31	0	0	17	0	0	17	0
Lane Group Flow (vph)	360	576	0	390	639	0	270	2583	0	240	2313	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	14.1	23.5		15.0	24.4		11.8	55.5		10.0	53.7	
Effective Green, g (s)	14.1	23.5		15.0	24.4		11.8	55.5		10.0	53.7	
Actuated g/C Ratio	0.12	0.20		0.12	0.20		0.10	0.46		0.08	0.45	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	403	669		429	691		338	2917		286	2823	
v/s Ratio Prot	0.10	c0.17		0.11	c0.19		0.08	c0.41		0.07	c0.37	
v/s Ratio Perm												
v/c Ratio	0.89	0.86		0.91	0.92		0.80	0.89		0.84	0.82	
Uniform Delay, d1	52.2	46.7		51.8	46.9		52.9	29.4		54.2	28.9	
Progression Factor	1.00	1.00		1.00	1.00		0.94	0.60		0.61	0.28	
Incremental Delay, d2	21.3	11.0		22.7	18.2		7.9	2.8		11.6	1.6	
Delay (s)	73.5	57.7		74.5	65.1		57.6	20.3		44.5	9.6	
Level of Service	E	E		E	E		E	C		D	A	
Approach Delay (s)		63.6			68.5			23.8			12.8	
Approach LOS		E			E			C			B	

#### Intersection Summary

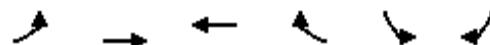
HCM Average Control Delay	31.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.86		0.97	0.86	
Fr <sub>t</sub>	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	6393		3433	6339	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	6393		3433	6339	
Volume (vph)	200	570	361	150	600	250	230	2510	40	230	2210	170
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	200	570	361	150	600	250	230	2510	40	230	2210	170
RTOR Reduction (vph)	0	0	146	0	0	148	0	2	0	0	9	0
Lane Group Flow (vph)	200	570	215	150	600	102	230	2548	0	230	2371	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Prot			
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	16.2	24.7	24.7	14.7	23.2	23.2	10.0	54.5		10.1	54.6	
Effective Green, g (s)	16.2	24.7	24.7	14.7	23.2	23.2	10.0	54.5		10.1	54.6	
Actuated g/C Ratio	0.13	0.21	0.21	0.12	0.19	0.19	0.08	0.45		0.08	0.46	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	239	728	326	217	684	306	286	2903		289	2884	
v/s Ratio Prot	c0.11	0.16		0.08	c0.17		0.07	c0.40		0.07	c0.37	
v/s Ratio Perm			0.14			0.06						
v/c Ratio	0.84	0.78	0.66	0.69	0.88	0.33	0.80	0.88		0.80	0.82	
Uniform Delay, d1	50.6	45.1	43.8	50.5	47.0	41.7	54.0	29.7		53.9	28.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.61	0.30		1.00	1.00	
Incremental Delay, d2	21.7	5.5	4.8	9.1	12.2	0.6	7.0	1.9		14.0	2.8	
Delay (s)	72.3	50.6	48.5	59.6	59.2	42.4	40.0	10.9		68.0	31.3	
Level of Service	E	D	D	E	E	D	D	B		E	C	
Approach Delay (s)		53.8			55.1			13.3			34.5	
Approach LOS		D			E			B			C	

#### Intersection Summary

HCM Average Control Delay	32.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		
c Critical Lane Group			

**2014**



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑	↑↑	↑↑	↑	↑↑	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	3433	1583
Volume (vph)	88	133	330	380	840	160
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	88	133	330	380	840	160
RTOR Reduction (vph)	0	0	0	203	0	114
Lane Group Flow (vph)	88	133	330	177	840	46
Turn Type	Prot			Perm		Perm
Protected Phases	1	6	2		8	
Permitted Phases				2		8
Actuated Green, G (s)	17.6	77.5	55.9	55.9	34.5	34.5
Effective Green, g (s)	17.6	77.5	55.9	55.9	34.5	34.5
Actuated g/C Ratio	0.15	0.65	0.47	0.47	0.29	0.29
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	260	2286	1649	737	987	455
v/s Ratio Prot	c0.05	0.04	0.09		c0.24	
v/s Ratio Perm				c0.11		0.03
v/c Ratio	0.34	0.06	0.20	0.24	0.85	0.10
Uniform Delay, d1	46.0	7.8	18.9	19.3	40.3	31.4
Progression Factor	1.00	1.00	0.64	0.24	1.00	1.00
Incremental Delay, d2	0.8	0.0	0.3	0.7	7.2	0.1
Delay (s)	46.8	7.9	12.4	5.3	47.5	31.5
Level of Service	D	A	B	A	D	C
Approach Delay (s)		23.4	8.6		44.9	
Approach LOS		C	A		D	

#### Intersection Summary

HCM Average Control Delay	29.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.88		0.86	0.86	1.00
Fr <sub>t</sub>	1.00	0.85		1.00	1.00	0.85
Flt Protected	0.95	1.00		1.00	1.00	1.00
Satd. Flow (prot)	3433	2787		6408	6408	1583
Flt Permitted	0.95	1.00		1.00	1.00	1.00
Satd. Flow (perm)	3433	2787		6408	6408	1583
Volume (vph)	112	881	0	2460	2690	650
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	112	881	0	2460	2690	650
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	112	880	0	2460	2690	650
Turn Type		Perm			Free	
Protected Phases	4			2	6	
Permitted Phases		4			Free	
Actuated Green, G (s)	41.0	41.0		71.0	71.0	120.0
Effective Green, g (s)	41.0	41.0		71.0	71.0	120.0
Actuated g/C Ratio	0.34	0.34		0.59	0.59	1.00
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	1173	952		3791	3791	1583
v/s Ratio Prot	0.03			0.38	c0.42	
v/s Ratio Perm		c0.32			0.41	
v/c Ratio	0.10	0.92		0.65	0.71	0.41
Uniform Delay, d <sub>1</sub>	26.9	38.0		16.2	17.2	0.0
Progression Factor	0.15	0.24		0.72	1.23	1.00
Incremental Delay, d <sub>2</sub>	0.0	10.4		0.6	0.7	0.4
Delay (s)	4.1	19.7		12.3	21.9	0.4
Level of Service	A	B		B	C	A
Approach Delay (s)	17.9			12.3	17.7	
Approach LOS	B			B	B	

#### Intersection Summary

HCM Average Control Delay	15.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑↑	↑	↑↑	↑↑↑	↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	*0.30	1.00	0.97	0.95	1.00	0.97	*0.80	1.00	*1.00	0.86	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1676	1583	3433	3539	1583	3433	4471	1583	3539	6408	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1676	1583	3433	3539	1583	3433	4471	1583	3539	6408	2787
Volume (vph)	180	712	129	110	400	310	130	1800	390	540	2650	340
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	180	712	129	110	400	310	130	1800	390	540	2650	340
RTOR Reduction (vph)	0	0	44	0	0	253	0	0	62	0	0	146
Lane Group Flow (vph)	180	712	85	110	400	57	130	1800	328	540	2650	195
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	16.9	32.0	32.0	4.0	19.1	19.1	8.0	49.0	49.0	19.0	60.0	60.0
Effective Green, g (s)	16.9	32.0	32.0	4.0	19.1	19.1	8.0	49.0	49.0	19.0	60.0	60.0
Actuated g/C Ratio	0.14	0.27	0.27	0.03	0.16	0.16	0.07	0.41	0.41	0.16	0.50	0.50
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	483	447	422	114	563	252	229	1826	646	560	3204	1394
v/s Ratio Prot	0.05	c0.42		c0.03	0.11		0.04	c0.40		c0.15	0.41	
v/s Ratio Perm			0.05			0.04			0.21			0.07
v/c Ratio	0.37	1.59	0.20	0.96	0.71	0.23	0.57	0.99	0.51	0.96	0.83	0.14
Uniform Delay, d1	46.7	44.0	34.1	57.9	47.8	44.0	54.3	35.2	26.5	50.2	25.6	16.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.59	0.36	0.19	1.21	0.60	0.54
Incremental Delay, d2	0.5	277.2	1.1	72.6	4.2	0.5	2.5	15.4	2.2	22.1	1.7	0.1
Delay (s)	47.2	321.2	35.2	130.5	52.0	44.5	34.6	28.0	7.4	82.7	17.1	8.9
Level of Service	D	F	D	F	D	D	C	C	A	F	B	A
Approach Delay (s)		236.8			59.7			24.9			26.3	
Approach LOS		F			E			C			C	

## Intersection Summary

HCM Average Control Delay	57.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Fr <sub>t</sub>	1.00	1.00	0.85	1.00	0.97		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3421		1770	6399		1770	6329	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3421		1770	6399		1770	6329	
Volume (vph)	170	480	220	50	280	80	150	2190	20	70	2568	230
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	170	480	220	50	280	80	150	2190	20	70	2568	230
RTOR Reduction (vph)	0	0	148	0	22	0	0	1	0	0	12	0
Lane Group Flow (vph)	170	480	72	50	338	0	150	2209	0	70	2786	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	15.0	22.9	22.9	7.2	15.1		13.3	65.9		8.0	60.6	
Effective Green, g (s)	15.0	22.9	22.9	7.2	15.1		13.3	65.9		8.0	60.6	
Actuated g/C Ratio	0.12	0.19	0.19	0.06	0.13		0.11	0.55		0.07	0.51	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	221	675	302	106	430		196	3514		118	3196	
v/s Ratio Prot	c0.10	c0.14		0.03	c0.10		c0.08	c0.35		0.04	c0.44	
v/s Ratio Perm			0.05									
v/c Ratio	0.77	0.71	0.24	0.47	0.79		0.77	0.63		0.59	0.87	
Uniform Delay, d1	50.8	45.5	41.2	54.6	50.9		51.8	18.6		54.4	26.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.85	0.26		0.83	0.13	
Incremental Delay, d2	14.8	3.5	0.4	3.3	9.2		13.9	0.7		4.4	2.1	
Delay (s)	65.6	49.0	41.6	57.9	60.1		57.7	5.6		49.7	5.5	
Level of Service	E	D	D	E	E		E	A		D	A	
Approach Delay (s)		50.4			59.8			8.9			6.5	
Approach LOS		D			E			A			A	

#### Intersection Summary

HCM Average Control Delay	16.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91		0.97	0.91		0.97	0.86		0.97	0.86	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	4993		3433	5027		3433	6319		3433	6408	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	4993		3433	5027		3433	6319		3433	6408	1583
Volume (vph)	300	1160	160	300	720	60	170	1380	140	270	1836	270
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	300	1160	160	300	720	60	170	1380	140	270	1836	270
RTOR Reduction (vph)	0	15	0	0	8	0	0	14	0	0	0	167
Lane Group Flow (vph)	300	1305	0	300	772	0	170	1506	0	270	1836	103
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	16.0	38.0		15.0	37.0		10.0	37.0		14.0	41.0	41.0
Effective Green, g (s)	16.0	38.0		15.0	37.0		10.0	37.0		14.0	41.0	41.0
Actuated g/C Ratio	0.13	0.32		0.12	0.31		0.08	0.31		0.12	0.34	0.34
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Grp Cap (vph)	458	1581		429	1550		286	1948		401	2189	541
v/s Ratio Prot	0.09	c0.26		c0.09	0.15		0.05	c0.24		0.08	c0.29	
v/s Ratio Perm												0.07
v/c Ratio	0.66	0.83		0.70	0.50		0.59	0.77		0.67	0.84	0.19
Uniform Delay, d1	49.4	37.9		50.3	33.9		53.0	37.7		50.8	36.4	27.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.61	0.45	0.27
Incremental Delay, d2	7.1	5.1		9.1	1.1		8.8	3.1		4.9	2.3	0.4
Delay (s)	56.5	43.0		59.5	35.1		61.8	40.7		36.1	18.7	7.8
Level of Service	E	D		E	D		E	D		D	B	A
Approach Delay (s)		45.5			41.8			42.9			19.4	
Approach LOS		D			D			D			B	

Intersection Summary

HCM Average Control Delay	35.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑		↑↑	↑↑		↑↑	↑↑↑↑		↑↑	↑↑↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.86		0.97	0.86	
Fr <sub>t</sub>	1.00	0.96		1.00	0.96		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3413		3433	3408		3433	6343		3433	6302	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3413		3433	3408		3433	6343		3433	6302	
Volume (vph)	283	416	130	380	520	170	190	2021	146	210	2500	310
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	283	416	130	380	520	170	190	2021	146	210	2500	310
RTOR Reduction (vph)	0	25	0	0	27	0	0	9	0	0	18	0
Lane Group Flow (vph)	283	521	0	380	663	0	190	2158	0	210	2792	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	11.3	21.1		15.5	25.3		8.3	55.4		12.0	59.1	
Effective Green, g (s)	11.3	21.1		15.5	25.3		8.3	55.4		12.0	59.1	
Actuated g/C Ratio	0.09	0.18		0.13	0.21		0.07	0.46		0.10	0.49	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	323	600		443	719		237	2928		343	3104	
v/s Ratio Prot	0.08	0.15		c0.11	c0.19		0.06	c0.34		0.06	c0.44	
v/s Ratio Perm												
v/c Ratio	0.88	0.87		0.86	0.92		0.80	0.74		0.61	0.90	
Uniform Delay, d1	53.7	48.1		51.2	46.4		55.0	26.4		51.8	27.7	
Progression Factor	1.00	1.00		1.00	1.00		1.04	0.64		0.58	0.23	
Incremental Delay, d2	22.3	12.7		15.1	17.3		14.2	1.3		1.3	1.9	
Delay (s)	76.0	60.8		66.2	63.7		71.5	18.2		31.1	8.3	
Level of Service	E	E		E	E		E	B		C	A	
Approach Delay (s)		66.0			64.6			22.5			9.9	
Approach LOS		E			E			C			A	

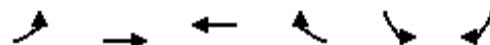
## Intersection Summary

HCM Average Control Delay	28.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.86		0.97	0.86	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	6400		3433	6337	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	6400		3433	6337	
Volume (vph)	190	520	510	130	580	180	270	2067	16	150	2390	190
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	190	520	510	130	580	180	270	2067	16	150	2390	190
RTOR Reduction (vph)	0	0	147	0	0	134	0	1	0	0	10	0
Lane Group Flow (vph)	190	520	363	130	580	46	270	2082	0	150	2570	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Prot			
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	15.3	29.4	29.4	10.0	24.1	24.1	11.0	55.9		8.7	53.6	
Effective Green, g (s)	15.3	29.4	29.4	10.0	24.1	24.1	11.0	55.9		8.7	53.6	
Actuated g/C Ratio	0.13	0.24	0.24	0.08	0.20	0.20	0.09	0.47		0.07	0.45	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	226	867	388	148	711	318	315	2981		249	2831	
v/s Ratio Prot	c0.11	0.15		0.07	0.16		c0.08	0.33		0.04	c0.41	
v/s Ratio Perm			c0.23			0.03						
v/c Ratio	0.84	0.60	0.93	0.88	0.82	0.14	0.86	0.70		0.60	0.91	
Uniform Delay, d1	51.2	40.1	44.4	54.4	45.8	39.5	53.7	25.4		54.0	30.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.71	0.36		1.00	1.00	
Incremental Delay, d2	23.5	1.1	29.5	40.1	7.2	0.2	13.4	0.9		4.1	5.5	
Delay (s)	74.7	41.2	73.9	94.5	53.0	39.7	51.6	10.1		58.0	36.4	
Level of Service	E	D	E	F	D	D	D	B		E	D	
Approach Delay (s)		60.1			56.4			14.8			37.6	
Approach LOS		E			E			B			D	

**Intersection Summary**

HCM Average Control Delay	36.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑	↑↑	↑↑	↑	↑↑	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Fr <sub>t</sub>	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	3433	1583
Volume (vph)	403	217	341	630	960	236
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	403	217	341	630	960	236
RTOR Reduction (vph)	0	0	0	422	0	162
Lane Group Flow (vph)	403	217	341	208	960	74
Turn Type	Prot			Perm		Perm
Protected Phases	1	6	2		8	
Permitted Phases				2		8
Actuated Green, G (s)	30.5	74.2	39.7	39.7	37.8	37.8
Effective Green, g (s)	30.5	74.2	39.7	39.7	37.8	37.8
Actuated g/C Ratio	0.25	0.62	0.33	0.33	0.31	0.31
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	450	2188	1171	524	1081	499
v/s Ratio Prot	c0.23	0.06	0.10		c0.28	
v/s Ratio Perm				c0.13		0.05
v/c Ratio	0.90	0.10	0.29	0.40	0.89	0.15
Uniform Delay, d <sub>1</sub>	43.2	9.3	29.7	30.9	39.1	29.5
Progression Factor	1.00	1.00	0.69	0.64	1.00	1.00
Incremental Delay, d <sub>2</sub>	19.9	0.1	0.5	1.9	9.0	0.1
Delay (s)	63.1	9.4	21.0	21.8	48.1	29.7
Level of Service	E	A	C	C	D	C
Approach Delay (s)		44.3	21.5		44.5	
Approach LOS		D	C		D	

#### Intersection Summary

HCM Average Control Delay	36.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑↑	↑↑	↑↑↑↑	↑↑↑↑	↑↑↑↑	↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.88		0.86	0.86	1.00
Frt	1.00	0.85		1.00	1.00	0.85
Flt Protected	0.95	1.00		1.00	1.00	1.00
Satd. Flow (prot)	3433	2787		6408	6408	1583
Flt Permitted	0.95	1.00		1.00	1.00	1.00
Satd. Flow (perm)	3433	2787		6408	6408	1583
Volume (vph)	175	982	0	2900	2190	941
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	175	982	0	2900	2190	941
RTOR Reduction (vph)	0	3	0	0	0	0
Lane Group Flow (vph)	175	979	0	2900	2190	941
Turn Type		Perm			Free	
Protected Phases	4			2	6	
Permitted Phases		4			Free	
Actuated Green, G (s)	45.8	45.8		66.2	66.2	120.0
Effective Green, g (s)	45.8	45.8		66.2	66.2	120.0
Actuated g/C Ratio	0.38	0.38		0.55	0.55	1.00
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	1310	1064		3535	3535	1583
v/s Ratio Prot	0.05		c0.45	0.34		
v/s Ratio Perm		c0.35			0.59	
v/c Ratio	0.13	0.92		0.82	0.62	0.59
Uniform Delay, d1	24.2	35.4		22.0	18.3	0.0
Progression Factor	0.91	1.10		1.17	1.67	1.00
Incremental Delay, d2	0.0	8.8		1.4	0.5	1.1
Delay (s)	22.0	47.6		27.2	31.1	1.1
Level of Service	C	D		C	C	A
Approach Delay (s)	43.7			27.2	22.1	
Approach LOS	D			C	C	

#### Intersection Summary

HCM Average Control Delay	27.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑↑	↑	↑↑	↑↑↑	↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.95	1.00	0.97	*0.70	1.00	*1.00	0.86	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	3539	1583	3433	3912	1583	3539	6408	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	3539	1583	3433	3912	1583	3539	6408	2787
Volume (vph)	390	740	301	210	622	280	567	2400	580	380	2370	760
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	390	740	301	210	622	280	567	2400	580	380	2370	760
RTOR Reduction (vph)	0	0	243	0	0	138	0	0	137	0	0	299
Lane Group Flow (vph)	390	740	58	210	622	142	567	2400	443	380	2370	461
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	13.0	23.0	23.0	10.0	20.0	20.0	23.0	59.0	59.0	12.0	48.0	48.0
Effective Green, g (s)	13.0	23.0	23.0	10.0	20.0	20.0	23.0	59.0	59.0	12.0	48.0	48.0
Actuated g/C Ratio	0.11	0.19	0.19	0.08	0.17	0.17	0.19	0.49	0.49	0.10	0.40	0.40
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	372	975	303	286	590	264	658	1923	778	354	2563	1115
v/s Ratio Prot	c0.11	0.15		0.06	c0.18		0.17	c0.61		c0.11	0.37	
v/s Ratio Perm			0.04			0.09			0.28			0.17
v/c Ratio	1.05	0.76	0.19	0.73	1.05	0.54	0.86	1.25	0.57	1.07	0.92	0.41
Uniform Delay, d1	53.5	45.9	40.7	53.7	50.0	45.8	47.0	30.5	21.5	54.0	34.3	25.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.38	0.04	1.06	0.63	0.28
Incremental Delay, d2	59.9	5.5	1.4	9.4	52.2	2.1	8.1	114.8	2.1	62.8	5.6	0.9
Delay (s)	113.4	51.4	42.1	63.1	102.2	47.9	36.4	126.4	3.0	119.8	27.2	8.1
Level of Service	F	D	D	E	F	D	D	F	A	F	C	A
Approach Delay (s)		66.3			81.1			91.8			33.1	
Approach LOS		E			F			F			C	

## Intersection Summary

HCM Average Control Delay	65.3	HCM Level of Service	E
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Fr <sub>t</sub>	1.00	1.00	0.85	1.00	0.96		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3393		1770	6393		1770	6329	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3393		1770	6393		1770	6329	
Volume (vph)	210	350	180	50	290	110	200	2636	40	150	2561	230
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	210	350	180	50	290	110	200	2636	40	150	2561	230
RTOR Reduction (vph)	0	0	148	0	33	0	0	2	0	0	12	0
Lane Group Flow (vph)	210	350	32	50	367	0	200	2674	0	150	2779	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	16.6	21.1	21.1	11.0	15.5		15.0	58.9		13.0	56.9	
Effective Green, g (s)	16.6	21.1	21.1	11.0	15.5		15.0	58.9		13.0	56.9	
Actuated g/C Ratio	0.14	0.18	0.18	0.09	0.13		0.12	0.49		0.11	0.47	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	245	622	278	162	438		221	3138		192	3001	
v/s Ratio Prot	c0.12	0.10		0.03	c0.11		c0.11	0.42		0.08	c0.44	
v/s Ratio Perm			0.02									
v/c Ratio	0.86	0.56	0.11	0.31	0.84		0.90	0.85		0.78	0.93	
Uniform Delay, d1	50.5	45.2	41.6	50.9	51.0		51.8	26.7		52.1	29.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.73	0.28		0.79	0.10	
Incremental Delay, d2	24.3	1.2	0.2	1.1	13.1		5.2	0.3		9.8	3.4	
Delay (s)	74.9	46.4	41.8	52.0	64.1		43.1	7.7		51.2	6.2	
Level of Service	E	D	D	D	E		D	A		D	A	
Approach Delay (s)		53.3			62.8			10.2			8.5	
Approach LOS		D			E			B			A	

#### Intersection Summary

HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91		0.97	0.91		0.97	0.86		0.97	0.86	1.00
Frt	1.00	0.97		1.00	0.97		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	4939		3433	4956		3433	6313		3433	6408	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	4939		3433	4956		3433	6313		3433	6408	1583
Volume (vph)	430	1050	250	300	1130	230	360	2375	260	280	2071	490
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	430	1050	250	300	1130	230	360	2375	260	280	2071	490
RTOR Reduction (vph)	0	33	0	0	26	0	0	16	0	0	0	188
Lane Group Flow (vph)	430	1267	0	300	1334	0	360	2619	0	280	2071	302
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	15.0	35.0		11.0	31.0		14.7	48.0		10.0	43.3	43.3
Effective Green, g (s)	15.0	35.0		11.0	31.0		14.7	48.0		10.0	43.3	43.3
Actuated g/C Ratio	0.12	0.29		0.09	0.26		0.12	0.40		0.08	0.36	0.36
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	429	1441		315	1280		421	2525		286	2312	571
v/s Ratio Prot	0.13	c0.26		0.09	c0.27		0.10	c0.41		0.08	c0.32	
v/s Ratio Perm												0.19
v/c Ratio	1.00	0.88		0.95	1.04		0.86	1.04		0.98	0.90	0.53
Uniform Delay, d1	52.5	40.5		54.2	44.5		51.6	36.0		54.9	36.2	30.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.53	0.31	0.12
Incremental Delay, d2	44.0	6.4		37.9	36.9		15.5	28.5		31.6	3.1	1.7
Delay (s)	96.5	46.9		92.2	81.4		67.1	64.5		60.8	14.2	5.4
Level of Service	F	D		F	F		E	E		E	B	A
Approach Delay (s)		59.2			83.3			64.8			17.3	
Approach LOS		E			F			E			B	

#### Intersection Summary

HCM Average Control Delay	52.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑		↑↑	↑↑		↑↑	↑↑↑↑		↑↑	↑↑↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.86		0.97	0.86	
Fr <sub>t</sub>	1.00	0.97		1.00	0.96		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3418		3433	3405		3433	6307		3433	6304	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3418		3433	3405		3433	6307		3433	6304	
Volume (vph)	372	471	140	426	534	180	270	2472	291	250	2228	271
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	372	471	140	426	534	180	270	2472	291	250	2228	271
RTOR Reduction (vph)	0	23	0	0	28	0	0	17	0	0	18	0
Lane Group Flow (vph)	372	588	0	426	686	0	270	2746	0	250	2481	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	14.0	23.1		15.9	25.0		10.0	56.0		9.0	55.0	
Effective Green, g (s)	14.0	23.1		15.9	25.0		10.0	56.0		9.0	55.0	
Actuated g/C Ratio	0.12	0.19		0.13	0.21		0.08	0.47		0.08	0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	401	658		455	709		286	2943		257	2889	
v/s Ratio Prot	0.11	0.17		c0.12	c0.20		0.08	c0.44		0.07	c0.39	
v/s Ratio Perm												
v/c Ratio	0.93	0.89		0.94	0.97		0.94	0.93		0.97	0.86	
Uniform Delay, d1	52.5	47.2		51.5	47.1		54.7	30.2		55.4	29.0	
Progression Factor	1.00	1.00		1.00	1.00		1.07	0.53		0.60	0.23	
Incremental Delay, d2	27.3	14.5		26.7	25.8		32.7	5.6		30.7	1.7	
Delay (s)	79.8	61.7		78.3	72.9		91.4	21.5		63.7	8.5	
Level of Service	E	E		E	E		F	C		E	A	
Approach Delay (s)		68.6			74.9			27.8			13.5	
Approach LOS		E			E			C			B	

#### Intersection Summary

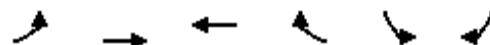
HCM Average Control Delay	34.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.86		0.97	0.86	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	6393		3433	6336	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	6393		3433	6336	
Volume (vph)	260	600	390	165	680	250	250	2653	41	230	2344	190
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	260	600	390	165	680	250	250	2653	41	230	2344	190
RTOR Reduction (vph)	0	0	138	0	0	126	0	2	0	0	11	0
Lane Group Flow (vph)	260	600	252	165	680	124	250	2692	0	230	2523	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Prot			
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	18.0	25.1	25.1	16.9	24.0	24.0	9.0	53.0		9.0	53.0	
Effective Green, g (s)	18.0	25.1	25.1	16.9	24.0	24.0	9.0	53.0		9.0	53.0	
Actuated g/C Ratio	0.15	0.21	0.21	0.14	0.20	0.20	0.08	0.44		0.08	0.44	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	266	740	331	249	708	317	257	2824		257	2798	
v/s Ratio Prot	c0.15	0.17		0.09	c0.19		0.07	c0.42		0.07	c0.40	
v/s Ratio Perm			0.16			0.08						
v/c Ratio	0.98	0.81	0.76	0.66	0.96	0.39	0.97	0.95		0.89	0.90	
Uniform Delay, d1	50.8	45.2	44.6	48.8	47.5	41.7	55.4	32.3		55.0	31.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.59	0.31		1.00	1.00	
Incremental Delay, d2	48.4	6.7	9.9	6.5	24.4	0.8	26.5	3.9		30.1	5.3	
Delay (s)	99.2	51.9	54.5	55.3	71.9	42.5	59.4	13.8		85.1	36.4	
Level of Service	F	D	D	E	E	D	E	B		F	D	
Approach Delay (s)		62.5			62.7			17.6			40.4	
Approach LOS		E			E			B			D	

#### Intersection Summary

HCM Average Control Delay	38.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		
c Critical Lane Group			

**2030**



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑	↑↑	↑↑	↑	↑↑	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Fr <sub>t</sub>	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	3433	1583
Volume (vph)	118	143	480	530	920	190
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	118	143	480	530	920	190
RTOR Reduction (vph)	0	0	0	314	0	130
Lane Group Flow (vph)	118	143	480	216	920	60
Turn Type	Prot			Perm		Perm
Protected Phases	1	6	2		8	
Permitted Phases				2		8
Actuated Green, G (s)	21.0	74.0	49.0	49.0	38.0	38.0
Effective Green, g (s)	21.0	74.0	49.0	49.0	38.0	38.0
Actuated g/C Ratio	0.18	0.62	0.41	0.41	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	310	2182	1445	646	1087	501
v/s Ratio Prot	c0.07	0.04	0.14		c0.27	
v/s Ratio Perm				c0.14		0.04
v/c Ratio	0.38	0.07	0.33	0.34	0.85	0.12
Uniform Delay, d <sub>1</sub>	43.8	9.2	24.3	24.3	38.3	29.1
Progression Factor	1.00	1.00	0.69	0.40	1.00	1.00
Incremental Delay, d <sub>2</sub>	0.8	0.1	0.5	1.2	6.2	0.1
Delay (s)	44.5	9.2	17.3	11.0	44.5	29.2
Level of Service	D	A	B	B	D	C
Approach Delay (s)		25.2	14.0		41.9	
Approach LOS		C	B		D	

#### Intersection Summary

HCM Average Control Delay	28.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.88		0.86	0.86	1.00
Fr <sub>t</sub>	1.00	0.85		1.00	1.00	0.85
Flt Protected	0.95	1.00		1.00	1.00	1.00
Satd. Flow (prot)	3433	2787		6408	6408	1583
Flt Permitted	0.95	1.00		1.00	1.00	1.00
Satd. Flow (perm)	3433	2787		6408	6408	1583
Volume (vph)	122	981	0	2770	3020	960
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	122	981	0	2770	3020	960
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	122	980	0	2770	3020	960
Turn Type		Perm			Free	
Protected Phases	4			2	6	
Permitted Phases		4			Free	
Actuated Green, G (s)	44.7	44.7		67.3	67.3	120.0
Effective Green, g (s)	44.7	44.7		67.3	67.3	120.0
Actuated g/C Ratio	0.37	0.37		0.56	0.56	1.00
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	1279	1038		3594	3594	1583
v/s Ratio Prot	0.04			0.43	c0.47	
v/s Ratio Perm		c0.35			0.61	
v/c Ratio	0.10	0.94		0.77	0.84	0.61
Uniform Delay, d <sub>1</sub>	24.5	36.4		20.4	21.9	0.0
Progression Factor	0.24	0.26		0.41	1.16	1.00
Incremental Delay, d <sub>2</sub>	0.0	12.2		1.2	1.3	0.9
Delay (s)	5.8	21.9		9.6	26.6	0.9
Level of Service	A	C		A	C	A
Approach Delay (s)	20.1			9.6	20.4	
Approach LOS	C			A	C	

#### Intersection Summary

HCM Average Control Delay	16.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑↑	↑	↑↑	↑↑↑	↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	*0.40	1.00	0.97	0.95	1.00	0.97	*0.80	1.00	*1.00	0.86	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	2235	1583	3433	3539	1583	3433	4471	1583	3539	6408	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	2235	1583	3433	3539	1583	3433	4471	1583	3539	6408	2787
Volume (vph)	200	812	129	120	460	320	140	2070	400	670	2820	440
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	200	812	129	120	460	320	140	2070	400	670	2820	440
RTOR Reduction (vph)	0	0	51	0	0	258	0	0	57	0	0	177
Lane Group Flow (vph)	200	812	78	120	460	62	140	2070	343	670	2820	263
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	15.2	32.0	32.0	4.0	20.8	20.8	7.0	48.0	48.0	20.0	61.0	61.0
Effective Green, g (s)	15.2	32.0	32.0	4.0	20.8	20.8	7.0	48.0	48.0	20.0	61.0	61.0
Actuated g/C Ratio	0.13	0.27	0.27	0.03	0.17	0.17	0.06	0.40	0.40	0.17	0.51	0.51
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	435	596	422	114	613	274	200	1788	633	590	3257	1417
v/s Ratio Prot	0.06	c0.36		c0.03	0.13		0.04	c0.46		c0.19	0.44	
v/s Ratio Perm			0.05			0.04			0.22			0.09
v/c Ratio	0.46	1.36	0.18	1.05	0.75	0.23	0.70	1.16	0.54	1.14	0.87	0.19
Uniform Delay, d1	48.6	44.0	33.9	58.0	47.1	42.7	55.5	36.0	27.6	50.0	25.9	16.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.37	0.19	1.18	0.85	1.45
Incremental Delay, d2	0.8	173.7	1.0	99.1	5.1	0.4	6.8	75.5	2.2	74.2	2.2	0.2
Delay (s)	49.4	217.7	34.9	157.1	52.3	43.1	40.1	89.0	7.3	133.1	24.1	23.4
Level of Service	D	F	C	F	D	D	D	F	A	F	C	C
Approach Delay (s)		167.6			63.0			73.8			42.6	
Approach LOS		F			E			E			D	

## Intersection Summary

HCM Average Control Delay	70.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Fr <sub>t</sub>	1.00	1.00	0.85	1.00	0.97		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3438		1770	6396		1770	6295	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3438		1770	6396		1770	6295	
Volume (vph)	180	620	240	60	380	90	160	2460	30	80	2628	350
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	180	620	240	60	380	90	160	2460	30	80	2628	350
RTOR Reduction (vph)	0	0	143	0	17	0	0	1	0	0	21	0
Lane Group Flow (vph)	180	620	97	60	453	0	160	2489	0	80	2957	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	14.6	26.8	26.8	4.8	17.0		12.8	62.8		9.6	59.6	
Effective Green, g (s)	14.6	26.8	26.8	4.8	17.0		12.8	62.8		9.6	59.6	
Actuated g/C Ratio	0.12	0.22	0.22	0.04	0.14		0.11	0.52		0.08	0.50	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	215	790	354	71	487		189	3347		142	3127	
v/s Ratio Prot	c0.10	c0.18		0.03	c0.13		c0.09	0.39		0.05	c0.47	
v/s Ratio Perm			0.06									
v/c Ratio	0.84	0.78	0.27	0.85	0.93		0.85	0.74		0.56	0.95	
Uniform Delay, d1	51.5	43.9	38.6	57.2	50.9		52.6	22.3		53.2	28.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.85	0.29		0.74	0.20	
Incremental Delay, d2	23.7	5.1	0.4	56.7	24.2		23.9	1.3		2.6	4.3	
Delay (s)	75.2	49.0	39.0	114.0	75.1		68.7	7.6		41.7	9.9	
Level of Service	E	D	D	F	E		E	A		D	A	
Approach Delay (s)		51.2			79.5			11.3			10.8	
Approach LOS		D			E			B			B	

**Intersection Summary**

HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		
c Critical Lane Group			

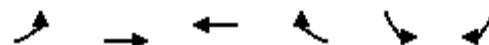
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91		0.97	0.91		0.97	0.86		0.97	0.86	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	4988		3433	5020		3433	6286		3433	6408	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	4988		3433	5020		3433	6286		3433	6408	1583
Volume (vph)	330	1160	170	410	750	70	220	1520	220	300	1846	340
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	330	1160	170	410	750	70	220	1520	220	300	1846	340
RTOR Reduction (vph)	0	16	0	0	9	0	0	22	0	0	0	209
Lane Group Flow (vph)	330	1314	0	410	811	0	220	1718	0	300	1846	131
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	18.0	35.0		17.0	34.0		10.0	39.0		13.0	42.0	42.0
Effective Green, g (s)	18.0	35.0		17.0	34.0		10.0	39.0		13.0	42.0	42.0
Actuated g/C Ratio	0.15	0.29		0.14	0.28		0.08	0.32		0.11	0.35	0.35
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Grp Cap (vph)	515	1455		486	1422		286	2043		372	2243	554
v/s Ratio Prot	0.10	c0.26		c0.12	0.16		0.06	c0.27		0.09	c0.29	
v/s Ratio Perm												0.08
v/c Ratio	0.64	0.90		0.84	0.57		0.77	0.84		0.81	0.82	0.24
Uniform Delay, d1	48.0	40.9		50.2	36.8		53.9	37.6		52.3	35.6	27.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.67	0.53	0.30
Incremental Delay, d2	6.0	9.5		16.2	1.7		17.9	4.4		8.2	1.6	0.5
Delay (s)	54.0	50.3		66.4	38.4		71.8	42.0		43.5	20.6	8.7
Level of Service	D	D		E	D		E	D		D	C	A
Approach Delay (s)		51.0			47.8			45.4			21.7	
Approach LOS		D			D			D			C	
<b>Intersection Summary</b>												
HCM Average Control Delay		39.0										D
HCM Volume to Capacity ratio		0.85										
Actuated Cycle Length (s)		120.0										12.0
Analysis Period (min)		15										
c Critical Lane Group												

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑		↑↑	↑↑		↑↑	↑↑↑↑		↑↑	↑↑↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.86		0.97	0.86	
Fr <sub>t</sub>	1.00	0.97		1.00	0.96		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3424		3433	3405		3433	6327		3433	6288	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3424		3433	3405		3433	6327		3433	6288	
Volume (vph)	293	506	140	460	530	180	200	2251	206	240	2820	400
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	293	506	140	460	530	180	200	2251	206	240	2820	400
RTOR Reduction (vph)	0	21	0	0	28	0	0	12	0	0	22	0
Lane Group Flow (vph)	293	625	0	460	682	0	200	2445	0	240	3199	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	11.4	21.0		16.0	25.6		7.0	56.0		11.0	60.0	
Effective Green, g (s)	11.4	21.0		16.0	25.6		7.0	56.0		11.0	60.0	
Actuated g/C Ratio	0.10	0.18		0.13	0.21		0.06	0.47		0.09	0.50	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	326	599		458	726		200	2953		315	3144	
v/s Ratio Prot	0.09	c0.18		c0.13	c0.20		0.06	c0.39		0.07	c0.51	
v/s Ratio Perm												
v/c Ratio	0.90	1.04		1.00	0.94		1.00	0.83		0.76	1.02	
Uniform Delay, d1	53.7	49.5		52.0	46.4		56.5	27.8		53.2	30.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	0.68		0.59	0.25	
Incremental Delay, d2	25.8	48.8		43.1	19.7		54.4	2.1		1.0	10.1	
Delay (s)	79.5	98.3		95.1	66.1		110.6	21.1		32.5	17.6	
Level of Service	E	F		F	E		F	C		C	B	
Approach Delay (s)		92.4			77.5			27.8			18.6	
Approach LOS		F			E			C			B	
<b>Intersection Summary</b>												
HCM Average Control Delay		38.4										D
HCM Volume to Capacity ratio		0.99										
Actuated Cycle Length (s)		120.0										12.0
Analysis Period (min)		15										
c Critical Lane Group												

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.86		0.97	0.86	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	6401		3433	6318	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	6401		3433	6318	
Volume (vph)	230	620	560	140	610	190	280	2277	16	160	2820	290
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	230	620	560	140	610	190	280	2277	16	160	2820	290
RTOR Reduction (vph)	0	0	114	0	0	136	0	1	0	0	14	0
Lane Group Flow (vph)	230	620	446	140	610	54	280	2292	0	160	3096	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Prot			
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	16.0	30.0	30.0	9.0	23.0	23.0	9.0	55.5		9.5	56.0	
Effective Green, g (s)	16.0	30.0	30.0	9.0	23.0	23.0	9.0	55.5		9.5	56.0	
Actuated g/C Ratio	0.13	0.25	0.25	0.08	0.19	0.19	0.08	0.46		0.08	0.47	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	236	885	396	133	678	303	257	2960		272	2948	
v/s Ratio Prot	c0.13	0.18		0.08	0.17		c0.08	0.36		0.05	c0.49	
v/s Ratio Perm			c0.28			0.03						
v/c Ratio	0.97	0.70	1.13	1.05	0.90	0.18	1.09	0.77		0.59	1.05	
Uniform Delay, d1	51.8	40.9	45.0	55.5	47.4	40.6	55.5	27.0		53.4	32.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.64	0.25		1.00	1.00	
Incremental Delay, d2	51.0	2.5	84.2	92.8	14.8	0.3	66.5	1.0		3.2	31.6	
Delay (s)	102.8	43.4	129.2	148.3	62.2	40.9	102.0	7.8		56.6	63.6	
Level of Service	F	D	F	F	E	D	F	A		E	E	
Approach Delay (s)		87.2			70.7			18.0			63.3	
Approach LOS		F			E			B			E	

**Intersection Summary**

HCM Average Control Delay	54.0	HCM Level of Service	D
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑	↑↑	↑↑	↑	↑↑	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Fr <sub>t</sub>	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	3433	1583
Volume (vph)	503	217	491	690	1030	286
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	503	217	491	690	1030	286
RTOR Reduction (vph)	0	0	0	444	0	179
Lane Group Flow (vph)	503	217	491	246	1030	107
Turn Type	Prot			Perm		Perm
Protected Phases	1	6	2		8	
Permitted Phases				2		8
Actuated Green, G (s)	36.3	73.8	33.5	33.5	38.2	38.2
Effective Green, g (s)	36.3	73.8	33.5	33.5	38.2	38.2
Actuated g/C Ratio	0.30	0.61	0.28	0.28	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	535	2176	988	442	1093	504
v/s Ratio Prot	c0.28	0.06	0.14		c0.30	
v/s Ratio Perm				c0.16		0.07
v/c Ratio	0.94	0.10	0.50	0.56	0.94	0.21
Uniform Delay, d <sub>1</sub>	40.8	9.5	36.2	36.9	39.8	29.9
Progression Factor	1.00	1.00	0.81	0.90	1.00	1.00
Incremental Delay, d <sub>2</sub>	24.9	0.1	1.3	3.5	15.3	0.2
Delay (s)	65.6	9.6	30.6	36.9	55.1	30.1
Level of Service	E	A	C	D	E	C
Approach Delay (s)		48.7	34.3		49.7	
Approach LOS		D	C		D	

#### Intersection Summary

HCM Average Control Delay	43.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.88		0.86	0.86	1.00
Fr <sub>t</sub>	1.00	0.85		1.00	1.00	0.85
Flt Protected	0.95	1.00		1.00	1.00	1.00
Satd. Flow (prot)	3433	2787		6408	6408	1583
Flt Permitted	0.95	1.00		1.00	1.00	1.00
Satd. Flow (perm)	3433	2787		6408	6408	1583
Volume (vph)	185	1032	0	3270	2420	1141
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	185	1032	0	3270	2420	1141
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	185	1030	0	3270	2420	1141
Turn Type		Perm			Free	
Protected Phases	4			2	6	
Permitted Phases		4			Free	
Actuated Green, G (s)	46.1	46.1		65.9	65.9	120.0
Effective Green, g (s)	46.1	46.1		65.9	65.9	120.0
Actuated g/C Ratio	0.38	0.38		0.55	0.55	1.00
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	1319	1071		3519	3519	1583
v/s Ratio Prot	0.05		c0.51	0.38		
v/s Ratio Perm		c0.37			0.72	
v/c Ratio	0.14	0.96		0.93	0.69	0.72
Uniform Delay, d <sub>1</sub>	24.1	36.1		24.9	19.6	0.0
Progression Factor	0.94	1.12		1.07	1.64	1.00
Incremental Delay, d <sub>2</sub>	0.0	13.0		4.3	0.5	1.3
Delay (s)	22.7	53.6		30.9	32.7	1.3
Level of Service	C	D		C	C	A
Approach Delay (s)	48.9			30.9	22.6	
Approach LOS	D			C	C	

#### Intersection Summary

HCM Average Control Delay	30.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑↑	↑	↑↑	↑↑	↑	↑↑	↑↑↑	↑	↑↑	↑↑↑	↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.95	1.00	0.97	*0.85	1.00	*1.00	0.86	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	3539	1583	3433	4750	1583	3539	6408	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	3539	1583	3433	4750	1583	3539	6408	2787
Volume (vph)	490	810	311	220	712	300	577	2670	630	440	2450	940
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	490	810	311	220	712	300	577	2670	630	440	2450	940
RTOR Reduction (vph)	0	0	241	0	0	149	0	0	133	0	0	335
Lane Group Flow (vph)	490	810	70	220	712	151	577	2670	497	440	2450	605
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	15.0	27.0	27.0	10.0	22.0	22.0	21.0	54.0	54.0	13.0	46.0	46.0
Effective Green, g (s)	15.0	27.0	27.0	10.0	22.0	22.0	21.0	54.0	54.0	13.0	46.0	46.0
Actuated g/C Ratio	0.12	0.22	0.22	0.08	0.18	0.18	0.18	0.45	0.45	0.11	0.38	0.38
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	429	1144	356	286	649	290	601	2138	712	383	2456	1068
v/s Ratio Prot	c0.14	0.16		0.06	c0.20		0.17	c0.56		c0.12	0.38	
v/s Ratio Perm			0.04			0.10			0.31			0.22
v/c Ratio	1.14	0.71	0.20	0.77	1.10	0.52	0.96	1.25	0.70	1.15	1.00	0.57
Uniform Delay, d1	52.5	42.9	37.7	53.9	49.0	44.2	49.1	33.0	26.5	53.5	36.9	29.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.61	0.42	0.09	1.05	0.70	0.39
Incremental Delay, d2	88.4	3.7	1.2	11.8	64.8	1.6	19.1	114.4	3.3	86.8	14.7	1.5
Delay (s)	140.9	46.6	38.9	65.6	113.8	45.8	48.9	128.3	5.8	143.0	40.4	12.8
Level of Service	F	D	D	E	F	D	D	F	A	F	D	B
Approach Delay (s)		73.8			88.6			96.6			45.4	
Approach LOS		E			F			F			D	

## Intersection Summary

HCM Average Control Delay	73.6	HCM Level of Service	E
HCM Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.86		1.00	0.86	
Fr <sub>t</sub>	1.00	1.00	0.85	1.00	0.97		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3423		1770	6394		1770	6315	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3423		1770	6394		1770	6315	
Volume (vph)	310	480	190	60	430	120	220	2776	40	160	2631	280
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	310	480	190	60	430	120	220	2776	40	160	2631	280
RTOR Reduction (vph)	0	0	148	0	21	0	0	2	0	0	15	0
Lane Group Flow (vph)	310	480	42	60	529	0	220	2814	0	160	2896	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	20.8	26.7	26.7	11.1	17.0		14.0	55.2		11.0	52.2	
Effective Green, g (s)	20.8	26.7	26.7	11.1	17.0		14.0	55.2		11.0	52.2	
Actuated g/C Ratio	0.17	0.22	0.22	0.09	0.14		0.12	0.46		0.09	0.44	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	307	787	352	164	485		207	2941		162	2747	
v/s Ratio Prot	c0.18	0.14		0.03	c0.15		c0.12	0.44		0.09	c0.46	
v/s Ratio Perm			0.03									
v/c Ratio	1.01	0.61	0.12	0.37	1.09		1.06	0.96		0.99	1.05	
Uniform Delay, d1	49.6	42.0	37.3	51.1	51.5		53.0	31.3		54.4	33.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.76	0.24		0.77	0.14	
Incremental Delay, d2	53.9	1.3	0.2	1.4	67.4		38.1	1.2		41.5	28.8	
Delay (s)	103.5	43.3	37.4	52.5	118.9		78.6	8.8		83.5	33.7	
Level of Service	F	D	D	D	F		E	A		F	C	
Approach Delay (s)		61.2			112.4			13.9			36.3	
Approach LOS		E			F			B			D	

#### Intersection Summary

HCM Average Control Delay	36.6	HCM Level of Service	D
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑↓↓		↑↑	↑↑↓↓		↑↑	↑↑↓↓		↑↑	↑↑↑↑	↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91		0.97	0.91		0.97	0.86		0.97	0.86	1.00
Frt	1.00	0.97		1.00	0.97		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	4945		3433	4936		3433	6313		3433	6408	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	4945		3433	4936		3433	6313		3433	6408	1583
Volume (vph)	440	1150	260	320	1190	290	380	2455	270	290	2111	520
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	440	1150	260	320	1190	290	380	2455	270	290	2111	520
RTOR Reduction (vph)	0	31	0	0	34	0	0	16	0	0	0	175
Lane Group Flow (vph)	440	1379	0	320	1446	0	380	2709	0	290	2111	345
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	14.0	34.0		12.0	32.0		14.0	48.0		10.0	44.0	44.0
Effective Green, g (s)	14.0	34.0		12.0	32.0		14.0	48.0		10.0	44.0	44.0
Actuated g/C Ratio	0.12	0.28		0.10	0.27		0.12	0.40		0.08	0.37	0.37
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	401	1401		343	1316		401	2525		286	2350	580
v/s Ratio Prot	0.13	c0.28		0.09	c0.29		0.11	c0.43		0.08	c0.33	
v/s Ratio Perm												0.22
v/c Ratio	1.10	0.98		0.93	1.10		0.95	1.07		1.01	0.90	0.59
Uniform Delay, d1	53.0	42.7		53.6	44.0		52.6	36.0		55.0	35.9	30.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.51	0.26	0.08
Incremental Delay, d2	73.8	20.2		31.6	56.3		31.5	41.2		32.3	1.9	1.3
Delay (s)	126.8	63.0		85.2	100.3		84.1	77.2		60.3	11.4	3.9
Level of Service	F	E		F	F		F	E		E	B	A
Approach Delay (s)		78.1			97.6			78.1			14.9	
Approach LOS		E			F			E			B	

## Intersection Summary

HCM Average Control Delay	62.7	HCM Level of Service	E
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑	↑↑		↑↑	↑↑		↑↑	↑↑↑↑		↑↑	↑↑↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.95		0.97	0.95		0.97	0.86		0.97	0.86	
Frt	1.00	0.97		1.00	0.97		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	3420		3433	3417		3433	6306		3433	6303	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	3420		3433	3417		3433	6306		3433	6303	
Volume (vph)	402	481	140	486	634	190	280	2782	331	270	2538	311
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	402	481	140	486	634	190	280	2782	331	270	2538	311
RTOR Reduction (vph)	0	23	0	0	24	0	0	17	0	0	18	0
Lane Group Flow (vph)	402	598	0	486	801	0	280	3096	0	270	2831	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	13.0	22.0		17.0	26.0		10.0	56.0		9.0	55.0	
Effective Green, g (s)	13.0	22.0		17.0	26.0		10.0	56.0		9.0	55.0	
Actuated g/C Ratio	0.11	0.18		0.14	0.22		0.08	0.47		0.08	0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	372	627		486	740		286	2943		257	2889	
v/s Ratio Prot	0.12	0.17		c0.14	c0.23		0.08	c0.49		0.08	c0.45	
v/s Ratio Perm												
v/c Ratio	1.08	0.95		1.00	1.08		0.98	1.05		1.05	0.98	
Uniform Delay, d1	53.5	48.5		51.5	47.0		54.9	32.0		55.5	32.0	
Progression Factor	1.00	1.00		1.00	1.00		1.15	0.55		0.56	0.22	
Incremental Delay, d2	69.9	24.9		40.8	57.4		40.7	30.7		32.1	2.2	
Delay (s)	123.4	73.4		92.3	104.4		104.1	48.1		63.0	9.3	
Level of Service	F	E		F	F		F	D		E	A	
Approach Delay (s)		93.0			99.9			52.8			14.0	
Approach LOS		F			F			D			B	
Intersection Summary												
HCM Average Control Delay		50.7										
HCM Volume to Capacity ratio		1.04										
Actuated Cycle Length (s)		120.0										
Analysis Period (min)		15										
c Critical Lane Group												

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.86		0.97	0.86	
Fr <sub>t</sub>	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	6395		3433	6324	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	6395		3433	6324	
Volume (vph)	410	680	460	185	860	260	310	2993	41	240	2614	250
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	410	680	460	185	860	260	310	2993	41	240	2614	250
RTOR Reduction (vph)	0	0	141	0	0	98	0	1	0	0	13	0
Lane Group Flow (vph)	410	680	319	185	860	162	310	3033	0	240	2851	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Prot			
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	23.0	28.9	28.9	19.1	25.0	25.0	9.0	49.0		7.0	47.0	
Effective Green, g (s)	23.0	28.9	28.9	19.1	25.0	25.0	9.0	49.0		7.0	47.0	
Actuated g/C Ratio	0.19	0.24	0.24	0.16	0.21	0.21	0.08	0.41		0.06	0.39	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	339	852	381	282	737	330	257	2611		200	2477	
v/s Ratio Prot	c0.23	0.19		0.10	c0.24		0.09	c0.47		0.07	c0.45	
v/s Ratio Perm			0.20			0.10						
v/c Ratio	1.21	0.80	0.84	0.66	1.17	0.49	1.21	1.16		1.20	1.15	
Uniform Delay, d1	48.5	42.8	43.3	47.4	47.5	41.9	55.5	35.5		56.5	36.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.58	0.35		1.00	1.00	
Incremental Delay, d2	118.6	5.3	14.7	5.4	89.4	1.1	96.4	73.1		128.0	73.1	
Delay (s)	167.1	48.1	58.0	52.8	136.9	43.0	128.6	85.5		184.5	109.6	
Level of Service	F	D	E	D	F	D	F	F		F	F	
Approach Delay (s)		82.5			106.3			89.5			115.4	
Approach LOS		F			F			F			F	

**Intersection Summary**

HCM Average Control Delay	99.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Analysis Period (min)	15		
c Critical Lane Group			

# **Appendix C**

## **PEAK HOUR TRIP DISTRIBUTION CALCULATIONS**

Rip Curl Trip Distribution

INBOUND		Southbound			Westbound			Northbound			Eastbound			Total
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Intersection														
8. Goldenwest St & Bolsa Ave	%	6.9%			1.0%							2.0%		9.9%
8. Goldenwest St & Bolsa Ave	AM	0			0							0		0
8. Goldenwest St & Bolsa Ave	PM	8			1							2		12
15. Goldenwest St & Mcfadden Ave	%	9.9%									6.9%			16.8%
15. Goldenwest St & Mcfadden Ave	AM	0									0			0
15. Goldenwest St & Mcfadden Ave	PM	12									8			20
16. Gothard St & McFadden Ave	%			12.3%								16.8%		29.1%
16. Gothard St & McFadden Ave	AM			0								0		0
16. Gothard St & McFadden Ave	PM			15								20		35
17. Gothard St & Center Ave	%	29.1%							26.3%					55.4%
17. Gothard St & Center Ave	AM	0							0					0
17. Gothard St & Center Ave	PM	35							10					45
18. I-405 SB Ramps & Center Ave	%		13.7%		25.9%									39.6%
18. I-405 SB Ramps & Center Ave	AM		0		0									0
18. I-405 SB Ramps & Center Ave	PM		16		31									48
19. Beach Blvd & Center Ave.	%		25.9%											25.9%
19. Beach Blvd & Center Ave.	AM		0											0
19. Beach Blvd & Center Ave.	PM		31											31
26. Goldenwest St. & Edinger Ave	%							2.6%			3.5%			6.1%
26. Goldenwest St. & Edinger Ave	AM							0			0			0
26. Goldenwest St. & Edinger Ave	PM							3			4			7
27. Gothard St & Edinger Ave	%				7.0%		13.4%		7.6%					28.0%
27. Gothard St & Edinger Ave	AM				0		0		0					0
27. Gothard St & Edinger Ave	PM				8		16		9					34
28. Beach Blvd & Edinger Ave	%			1.6%		5.7%								7.3%
28. Beach Blvd & Edinger Ave	AM			0		0								0
28. Beach Blvd & Edinger Ave	PM		2		7									9
29. Newland St & Edinger Ave	%			1.4%										1.4%
29. Newland St & Edinger Ave	AM			0										0
29. Newland St & Edinger Ave	PM		2											2
36. Gothard St & Heil Ave	%			1.6%		8.4%		2.8%						12.8%
36. Gothard St & Heil Ave	AM			0		0		0						0
36. Gothard St & Heil Ave	PM		2		10		3							15
37. Beach Blvd & Heil Ave	%			.		5.3%								5.3%
37. Beach Blvd & Heil Ave	AM					0								0
37. Beach Blvd & Heil Ave	PM					6								6
46. Gothard St & Warner Ave	%			1.4%		5.6%		.						7.0%
46. Gothard St & Warner Ave	AM			0		0								0
46. Gothard St & Warner Ave	PM		2		7									8
47. Beach Blvd & Warner Ave	%			.		4.0%								4.0%
47. Beach Blvd & Warner Ave	AM					0								0
47. Beach Blvd & Warner Ave	PM					5								5
250. Beach Blvd & McFadden Ave	%	6.5%	9.3%	4.9%	3.0%									23.7%
250. Beach Blvd & McFadden Ave	AM	0	0	0	0									0
250. Beach Blvd & McFadden Ave	PM	8	11	6	4									28
251. Beach Blvd & Bolsa Ave	%	11.4%		4.1%							.			15.5%
251. Beach Blvd & Bolsa Ave	AM	0		0										0
251. Beach Blvd & Bolsa Ave	PM	14		5										19
AM Out Volume												TOTAL	0	
		150										TOTAL	324	
PM Out Volume														
		24												
AM In Volume														
		0												
PM In Volume														
		120												

Rip Curl Trip Distribution

OUTBOUND		Southbound			Westbound			Northbound			Eastbound			Total
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Intersection														
8. Goldenwest St & Bolsa Ave	%							2.0%	6.8%	1.0%				9.8%
	AM							3	10	2				15
	PM							0	2	0				2
15. Goldenwest St & Mcfadden Ave	%				6.9%	11.4%								18.3%
	AM				10	17								27
	PM				2	3								4
16. Gothard St & McFadden Ave	%							18.3%		12.3%				30.6%
	AM							27		18				46
	PM							4		3				7
17. Gothard St & Center Ave	%				23.5%		29.1%							52.6%
	AM				35		44							79
	PM				6		7							13
18. I-405 SB Ramps & Center Ave	%										12.1%	28.8%		40.9%
	AM										18	43		61
	PM										3	7		10
19. Beach Blvd & Center Ave.	%										21.5%		7.3%	28.8%
	AM										32		11	43
	PM										5		2	7
26. Goldenwest St. & Edinger Ave	%				2.6%	3.5%	1.5%							7.6%
	AM				4	5	2							11
	PM				1	1	0							2
27. Gothard St & Edinger Ave	%	2.5%	13.4%	7.6%										23.5%
	AM	4	20	11										35
	PM	1	3	2										6
28. Beach Blvd & Edinger Ave	%	1.6%	5.7%								1.5%	1.0%		9.8%
	AM	2	9								2	2		15
	PM	0	1								0	0		2
29. Newland St & Edinger Ave	%										1.4%			1.4%
	AM										2			2
	PM										0			0
36. Gothard St & Heil Ave	%	1.6%	8.4%	2.8%										12.8%
	AM	2	13	4										19
	PM	0	2	1										3
37. Beach Blvd & Heil Ave	%		5.3%											5.3%
	AM		8											8
	PM		1											1
46. Gothard St & Warner Ave	%	1.4%	5.6%	.										7.0%
	AM	2	8											11
	PM	0	1											2
47. Beach Blvd & Warner Ave	%	.	4.0%											4.0%
	AM		6											6
	PM		1											1
250. Beach Blvd & McFadden Ave	%							7.0%	4.0%	8.4%	3.9%			23.3%
	AM							11	6	13	6			35
	PM							2	1	2	1			6
251. Beach Blvd & Bolsa Ave	%						.	11.4%	4.1%					15.5%
	AM							17	6					23
	PM							3	1					4
AM Out Volume														437
		150												70
PM Out Volume			24											
AM In Volume			0											
PM In Volume			120											

# **Appendix D**

## **STATE HIGHWAY SYSTEM ANALYSIS**

Table D-1      2030 Freeway Volumes

Table D-2      2030 Freeway Weaving Section

Table D-3      CD Weaving Sections

HCM Calculations:

Mainline

Weaving Sections

Table D-1

## 2030 FREEWAY VOLUMES

SOUTHBOUND				NORTHBOUND			
LOCATION	WEAVE	AM	PM	LOCATION	WEAVE	AM	PM
<b>Mainline at Westminster</b>		<b>11,400</b>	<b>10,400</b>	<b>Mainline at Westminster</b>		<b>11,100</b>	<b>12,900</b>
Westminster SB On	On	760	1,030	Westminster (Willow Lane) NB Off	Off	160	200
<b>I-405 SB Mainline *</b>	Weave	<b>12,160</b>	<b>11,430</b>	<b>I-405 NB Mainline *</b>	Weave	<b>11,260</b>	<b>13,100</b>
Goldenwest SB CD Road Off	Off	830	1,120	Goldenwest Loop On	On	840	1,060
Goldenwest SB CD Road On	On	920	1,460	Bolsa Loop Off	Off	1,200	970
<b>I-405 SB Mainline *</b>	Weave	<b>12,250</b>	<b>11,770</b>	<b>I-405 NB Mainline *</b>	Weave	<b>11,620</b>	<b>13,010</b>
Beach SB CD Road Off	Off	1,180	1,570	Beach NB CD Road On	On	1,860	2,120
Beach SB CD Road On		590	1,040	Beach NB CD Road Off	Off	1,780	2,050
Edinger Direct SB On	On	1,080	980				
<b>I-405 SB Mainline *</b>	Weave	<b>12,740</b>	<b>12,220</b>	<b>I-405 NB Mainline *</b>	Weave	<b>11,540</b>	<b>12,940</b>
Magnolia SB Off	Off	270	1,140	Magnolia NB Direct On		250	260

\* Mainline Volume Includes Weave Volume

Table D-2

## FREEWAY WEAVING SECTIONS

NORTH OF GOLDENWEST - SB		VOLUME			NORTH OF GOLDENWEST - NB			VOLUME			
LOCATION	Lanes	AM	(Proj.)	PM	(Proj.)	LOCATION	Lanes	AM	(Proj.)	PM	(Proj.)
Mainline Through	5	10,570	0	9,280	17	Mainline Through	5	10,260	16	11,840	2
SB On-ramp (Westminster)	Aux.	680	0	930	0	To NB Off-ramp (Willow Lane)	Aux.	150	0	190	0
Goldenwest SB CD Road Off-ramp	Aux.	750	0	1,020	5	Goldenwest NB Loop On-ramp	Aux.	830	5	1,050	1
Ramp to Ramp	Aux.	80	0	100		Ramp to Ramp	Aux.	10		10	
WEAVING DISTANCE	1750'				WEAVING DISTANCE	2150'					
TOTAL SB ON		760	0	1,030	0	TOTAL OFF		160	0	200	0
TOTAL SB OFF		830	0	1,120	5	TOTAL ON		840	5	1,060	1
TOTAL WEAVE SECTION		1,590	0	2,150	5	TOTAL WEAVE SECTION		1,000	5	1,260	1
TOTAL FWY SECTION VOLUME		12,160	0	11,430	22	TOTAL FWY SECTION VOLUME		11,260	21	13,100	3
NORTH OF BEACH - SB		VOLUME			NORTH OF BEACH - NB			VOLUME			
LOCATION	Lanes	AM	(Proj.)	PM	(Proj.)	LOCATION	Lanes	AM	(Proj.)	PM	(Proj.)
Mainline Through	5	10,150	0	8,740	0	Mainline Through	5	8,560	0	9,920	0
Goldenwest SB CD Road On-ramp	Aux.	830	0	1,380	0	Bolsa NB Loop Off-ramp	Aux.	1,100	0	860	0
Beach SB CD Road Off-ramp	Aux. + Opt.	1,090	0	1,490	16	Beach NB CD Road On-ramp	Aux. + Opt.	1,760	16	2,010	2
Ramp to Ramp	Aux.	90	0	80		Ramp to Ramp	Aux.	100		110	
WEAVING DISTANCE	1150'				WEAVING DISTANCE	1750'					
TOTAL SB ON		920	0	1,460	0	TOTAL OFF		1,200	0	970	0
TOTAL SB OFF		1,180	0	1,570	16	TOTAL ON		1,860	16	2,120	2
TOTAL WEAVE SECTION		2,100	0	3,030	16	TOTAL WEAVE SECTION		3,060	16	3,090	2
TOTAL FWY SECTION VOLUME		12,250	0	11,770	16	TOTAL FWY SECTION VOLUME		11,620	16	13,010	2
SOUTH OF BEACH - SB		VOLUME			SOUTH OF BEACH - NB			VOLUME			
LOCATION	Lanes	AM	(Proj.)	PM	(Proj.)	LOCATION	Lanes	AM	(Proj.)	PM	(Proj.)
Mainline Through	5	11,390	18	10,100	3	Mainline Through	5	9,510	0	10,630	0
Edinger Direct SB On-ramp	Aux.	1,050	5	900	1	Beach NB CD Road Off-ramp	Aux.	1,710	0	1,980	22
Magnolia SB Off-ramp	Aux.	240	0	1,060	0	Magnolia NB Direct On-ramp	Aux.	180	0	190	0
Ramp to Ramp	Aux.	30		80		Ramp to Ramp	Aux.	70		70	
WEAVING DISTANCE	2400'				WEAVING DISTANCE	2000'					
TOTAL OFF		1,080	5	980	1	TOTAL OFF		1,780	0	2,050	22
TOTAL ON		270	0	1,140	0	TOTAL ON		250	0	260	0
TOTAL WEAVE SECTION		1,350	5	2,120	1	TOTAL WEAVE SECTION		2,030	0	2,310	22
TOTAL FWY SECTION VOLUME		12,740	23	12,220	4	TOTAL FWY SECTION VOLUME		11,540	0	12,940	22

Note: All volumes exclusive of HOV lane volumes

**Table D-3**  
**CD WEAVING SECTIONS**

<b>BEACH SB CD ROAD</b>		<b>VOLUME</b>			
<b>LOCATION</b>	<b>Lanes</b>	<b>AM</b>	<b>Proj.</b>	<b>PM</b>	<b>Proj.</b>
SB On-ramp from Center Ave	1	650	18	1,190	2
SB Off-ramp to Beach NB	1	170	0	370	0
TOTAL		820	18	1,560	2
VOLUME/CAPACITY	2	0.46	0.01	0.87	0.00

<b>BEACH NB CD ROAD</b>		<b>VOLUME</b>			
<b>LOCATION</b>	<b>Lanes</b>	<b>AM</b>	<b>Proj.</b>	<b>PM</b>	<b>Proj.</b>
NB On-ramp from Beach NB	1	1,510	16	1,720	3
NB Off-ramp to Beach SB	1	840	0	1,040	17
TOTAL		2,350	16	2,760	20
VOLUME/CAPACITY	2	1.31	0.01	1.53	0.01

Joe Foust  
Austin-Foust Associates, Inc.

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

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Operational Analysis

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## Analyst:

Agency or Company:

Date Performed: 6/24/2008

Analysis Time Period: AM Peak Hour

Freeway/Direction: I-405 SB

From/To: North of Goldenwest

Jurisdiction:

Analysis Year: No Project

Description:

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Flow Inputs and Adjustments

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Volume, V	11400	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	3167	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	2559	pc/h/ln

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Speed Inputs and Adjustments

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2559	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	5	
Density, D		pc/mi/ln

Overall results are not computed when free-flow speed is less than 55 mph.

Joe Foust  
Austin-Foust Associates, Inc.

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

---

Operational Analysis

---

## Analyst:

## Agency or Company:

Date Performed: 6/24/2008

Analysis Time Period: PM Peak Hour

Freeway/Direction: I-405 SB

From/To: North of Goldenwest

Jurisdiction:

Analysis Year: No Project

Description:

---

Flow Inputs and Adjustments

---

Volume, V	10400	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2889	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	2334	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2334	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	52.8	mi/h
Number of lanes, N	5	
Density, D	44.2	pc/mi/ln

Overall results are not computed when free-flow speed is less than 55 mph.

Joe Foust  
Austin-Foust Associates, Inc.

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

---

Operational Analysis

---

## Analyst:

## Agency or Company:

Date Performed: 6/24/2008

Analysis Time Period: AM Peak Hour

Freeway/Direction: I-405 NB

From/To: North of Goldenwest

Jurisdiction:

Analysis Year: No Project

Description:

---

Flow Inputs and Adjustments

---

Volume, V	10420	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2894	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	2339	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2339	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	52.6	mi/h
Number of lanes, N	5	
Density, D	44.4	pc/mi/ln

Overall results are not computed when free-flow speed is less than 55 mph.

Joe Foust  
Austin-Foust Associates, Inc.

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

---

Operational Analysis

---

## Analyst:

Agency or Company:

Date Performed: 6/24/2008

Analysis Time Period: PM Peak Hour

Freeway/Direction: I-405 NB

From/To: North of Goldenwest

Jurisdiction:

Analysis Year: No Project

Description:

---

Flow Inputs and Adjustments

---

Volume, V	12040	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	3344	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	2702	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2702	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	5	
Density, D		pc/mi/ln

Overall results are not computed when free-flow speed is less than 55 mph.

Joe Foust  
Austin-Foust Associates, Inc.

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

---

Operational Analysis

---

## Analyst:

## Agency or Company:

Date Performed: 6/24/2008

Analysis Time Period: AM Peak Hour

Freeway/Direction: I-405 SB

From/To: North of Beach

Jurisdiction:

Analysis Year: No Project

Description:

---

Flow Inputs and Adjustments

---

Volume, V	11330	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	3147	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	2543	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2543	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	5	
Density, D		pc/mi/ln

Overall results are not computed when free-flow speed is less than 55 mph.

Joe Foust  
Austin-Foust Associates, Inc.

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

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Operational Analysis

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## Analyst:

## Agency or Company:

Date Performed: 6/24/2008

Analysis Time Period: PM Peak Hour

Freeway/Direction: I-405 SB

From/To: North of Beach

Jurisdiction:

Analysis Year: No Project

Description:

---

Flow Inputs and Adjustments

---

Volume, V	10310	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2864	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	2314	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2314	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	53.5	mi/h
Number of lanes, N	5	
Density, D	43.2	pc/mi/ln

Overall results are not computed when free-flow speed is less than 55 mph.

Joe Foust  
Austin-Foust Associates, Inc.

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

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Operational Analysis

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## Analyst:

Agency or Company:

Date Performed: 6/24/2008

Analysis Time Period: AM Peak Hour

Freeway/Direction: I-405 NB

From/To: North of Beach

Jurisdiction:

Analysis Year: No Project

Description:

---

Flow Inputs and Adjustments

---

Volume, V	9760	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	2711	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	2191	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2191	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	57.3	mi/h
Number of lanes, N	5	
Density, D	38.2	pc/mi/ln

Overall results are not computed when free-flow speed is less than 55 mph.

Joe Foust  
Austin-Foust Associates, Inc.

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

---

Operational Analysis

---

## Analyst:

## Agency or Company:

Date Performed: 6/24/2008

Analysis Time Period: PM Peak Hour

Freeway/Direction: I-405 NB

From/To: North of Beach

Jurisdiction:

Analysis Year: No Project

Description:

---

Flow Inputs and Adjustments

---

Volume, V	10890	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	3025	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	2444	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2444	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	5	
Density, D		pc/mi/ln

Overall results are not computed when free-flow speed is less than 55 mph.

Joe Foust  
Austin-Foust Associates, Inc.

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

---

Operational Analysis

---

## Analyst:

## Agency or Company:

Date Performed: 6/24/2008

Analysis Time Period: AM Peak Hour

Freeway/Direction: I-405 SB

From/To: South of Beach

Jurisdiction:

Analysis Year: No Project

Description:

---

Flow Inputs and Adjustments

---

Volume, V	11660	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	3239	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	2617	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2617	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	5	
Density, D		pc/mi/ln

Overall results are not computed when free-flow speed is less than 55 mph.

Joe Foust  
Austin-Foust Associates, Inc.

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

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Operational Analysis

---

## Analyst:

## Agency or Company:

Date Performed: 6/24/2008

Analysis Time Period: PM Peak Hour

Freeway/Direction: I-405 SB

From/To: South of Beach

Jurisdiction:

Analysis Year: No Project

Description:

---

Flow Inputs and Adjustments

---

Volume, V	11240	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	3122	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	2523	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2523	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	5	
Density, D		pc/mi/ln

Overall results are not computed when free-flow speed is less than 55 mph.

Joe Foust  
Austin-Foust Associates, Inc.

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

---

Operational Analysis

---

## Analyst:

## Agency or Company:

Date Performed: 6/24/2008

Analysis Time Period: AM Peak Hour

Freeway/Direction: I-405 NB

From/To: South of Beach

Jurisdiction:

Analysis Year: No Project

Description:

---

Flow Inputs and Adjustments

---

Volume, V	11290	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	3136	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	2534	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2534	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	5	
Density, D		pc/mi/ln

Overall results are not computed when free-flow speed is less than 55 mph.

Joe Foust  
Austin-Foust Associates, Inc.

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

---

Operational Analysis

---

## Analyst:

## Agency or Company:

Date Performed: 6/24/2008

Analysis Time Period: PM Peak Hour

Freeway/Direction: I-405 NB

From/To: South of Beach

Jurisdiction:

Analysis Year: No Project

Description:

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Flow Inputs and Adjustments

---

Volume, V	12680	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	3522	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	2846	pc/h/ln

---

Speed Inputs and Adjustments

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

LOS and Performance Measures

---

Flow rate, vp	2846	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	5	
Density, D		pc/mi/ln

Overall results are not computed when free-flow speed is less than 55 mph.

# HCS2000: Freeway Weaving Release 4.1

Ryan  
Austin-Foust Associates

Phone: 714 667-0496

Fax:

E-mail:

## Operational Analysis

Analyst:

Agency/Co.:

Date Performed: 6/27/2008

Analysis Time Period: AM

Freeway/dir or Travel: North Bound 405

Weaving Location: South of Beach

Jurisdiction:

Analysis Year: 2030

Description: HBfreeway

## Inputs

Freeway free-flow speed, SFF	65	mph
Weaving number of lanes, N	5	
Weaving segment length, L	2000	ft
Terrain type	Level	
Grade	%	
Length	mi	
Weaving type	A	Multilane or C-D
Volume ratio, VR	0.20	
Weaving ratio, R	0.10	

## Conversion to pc/h Under Base Conditions

	Non-Weaving	Weaving			
	V	V	V	V	
	A-C	B-D	A-D	B-C	
/volume, V	7608	70	1710	180	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	2113	19	475	50	v
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	8537	78	1919	202	pc/h

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## Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
Weaving intensity factor, Wi	2.03	0.30
Weaving and non-weaving speeds, Si	33.15	57.47
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)	1.65	
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40	
Type of operation is	Constrained	

---

Weaving Segment Speed, Density, Level of Service and Capacity

---

Weaving segment speed, S	50.20 mph
Weaving segment density, D	42.78 pc/mi/ln
Level of service, LOS	E
Capacity for base condition, cb	10778 pc/h

---

Limitations on Weaving Segments

---

	Analyzed	Maximum	If Max Exceeded See Note
Weaving flow rate, Vw	2121	2800	a
Average flow rate (pcphpl)	2147	2350	b
Volume ratio, VR	0.20	0.20	c
Weaving ratio, R	0.10	N/A	d
Weaving length (ft)	2000	2500	e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

HCS2000: Freeway Weaving Release 4.1

Ryan  
Austin-Foust Associates

Phone: 714 667-0496  
E-mail:

Fax:

---

Operational Analysis

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Analyst:  
Agency/Co.:  
Date Performed: 6/27/2008  
Analysis Time Period: AM  
Freeway/dir or Travel: North Bound 405  
Weaving Location: North of GOLDENWEST  
Jurisdiction:  
Analysis Year: 2030  
Description: HBfreeway

---

Inputs

---

Freeway free-flow speed, SFF	65	mph
Weaving number of lanes, N	5	
Weaving segment length, L	2150	ft
Terrain type	Level	
Grade	%	
Length	mi	
Weaving type	A	Multilane or C-D
Volume ratio, VR	0.11	
Weaving ratio, R	0.15	

---

Conversion to pc/h Under Base Conditions

---

	Non-Weaving	Weaving		
	V	V	V	V
	A-C	B-D	A-D	B-C
Volume, V	8208	10	150	830
Peak-hour factor, PHF	0.90	0.90	0.90	0.90
Peak 15-min volume, v15	2280	3	42	231
Trucks and buses	2	2	2	%
Recreational vehicles	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990
Driver population adjustment, fP	1.00	1.00	1.00	1.00
Flow rate, v	9211	11	168	931
				pc/h

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Weaving and Non-Weaving Speeds

---

	Weaving	Non-Weaving
Weaving intensity factor, Wi	0.66	0.34
Weaving and non-weaving speeds, Si	48.05	56.09
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)	1.14	
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40	
Type of operation is	Unconstrained	

---

Weaving Segment Speed, Density, Level of Service and Capacity

---

Weaving segment speed, S	55.11 mph
Weaving segment density, D	37.46 pc/mi/ln
Level of service, LOS	E
Capacity for base condition, cb	11522 pc/h

---

Limitations on Weaving Segments

---

Analyzed	If Max Exceeded See Note	
	Maximum	Note
Weaving flow rate, Vw	1099	2800 a
Average flow rate (pcphpl)	2064	2350 b
Volume ratio, VR	0.11	0.20 c
Weaving ratio, R	0.15	N/A d
Weaving length (ft)	2150	2500 e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

HCS2000: Freeway Weaving Release 4.1

Ryan  
Austin-Foust Associates

Phone: 714 667-0496

Fax:

E-mail:

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Operational Analysis

---

Analyst:

Agency/Co.:

Date Performed: 6/27/2008

Analysis Time Period: AM

Freeway/dir or Travel: North Bound 405

Weaving Location: North of Beach

Jurisdiction:

Analysis Year: 2030

Description: HBfreeway

---

Inputs

---

Freeway free-flow speed, SFF	65	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1750	ft
Terrain type	Level	
Grade	%	
Length	mi	
Weaving type	B	Multilane or C-D
Volume ratio, VR	0.29	
Weaving ratio, R	0.38	

---

Conversion to pc/h Under Base Conditions

---

	Non-Weaving	Weaving		
	V	V	V	V
	A-C	B-D	A-D	B-C
Volume, V	6848	100	1100	1760
Peak-hour factor, PHF	0.90	0.90	0.90	0.90
Peak 15-min volume, v15	1902	28	306	489
Trucks and buses	2	2	2	%
Recreational vehicles	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990
Driver population adjustment, fP	1.00	1.00	1.00	1.00
Flow rate, v	7684	112	1234	1975
				pc/h

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---

Weaving and Non-Weaving Speeds

---

	Weaving	Non-Weaving
Weaving intensity factor, Wi	0.73	0.49
Weaving and non-weaving speeds, Si	46.71	51.95
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)	1.65	
Maximum number of lanes, Nw (max) (Exhibit 24-7)	3.50	
Type of operation is	Unconstrained	

---

Weaving Segment Speed, Density, Level of Service and Capacity

---

Weaving segment speed, S	50.30 mph
Weaving segment density, D	43.75 pc/mi/ln
Level of service, LOS	F
Capacity for base condition, cb	11302 pc/h

---

Limitations on Weaving Segments

---

	If Max Exceeded See Note		
Analyzed	Maximum	Note	
Weaving flow rate, Vw	3209	4000	a
Average flow rate (pcphpl)	2201	2350	b
Volume ratio, VR	0.29	0.80	c
Weaving ratio, R	0.38	N/A	d
Weaving length (ft)	1750	2500	e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

HCS2000: Freeway Weaving Release 4.1

Ryan  
Austin-Foust Associates

Phone: 714 667-0496  
E-mail:

Fax:

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Operational Analysis

---

Analyst:  
Agency/Co.:  
Date Performed: 6/27/2008  
Analysis Time Period: AM  
Freeway/dir or Travel: South Bound 405  
Weaving Location: North of BEACH  
Jurisdiction:  
Analysis Year: 2030  
Description: HBfreeway

---

Inputs

---

Freeway free-flow speed, SFF	65	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1150	ft
Terrain type	Level	
Grade	%	
Length	mi	
Weaving type	B	Multilane or C-D
Volume ratio, VR	0.19	
Weaving ratio, R	0.43	

---

Conversion to pc/h Under Base Conditions

---

	Non-Weaving	Weaving		
	V	V	V	V
	A-C	B-D	A-D	B-C
/volume, V	8120	90	1090	830
Peak-hour factor, PHF	0.90	0.90	0.90	0.90
Peak 15-min volume, v15	2256	25	303	231
Trucks and buses	2	2	2	%
Recreational vehicles	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990
Driver population adjustment, fP	1.00	1.00	1.00	1.00
Flow rate, v	9112	101	1223	931
				pc/h

D-35

---

Weaving and Non-Weaving Speeds

---

	Weaving	Non-Weaving
Weaving intensity factor, Wi	0.77	0.38
Weaving and non-weaving speeds, Si	46.02	54.86
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)	1.32	
Maximum number of lanes, Nw (max) (Exhibit 24-7)	3.50	
Type of operation is	Unconstrained	

---

Weaving Segment Speed, Density, Level of Service and Capacity

---

Weaving segment speed, S	52.93 mph
Weaving segment density, D	42.95 pc/mi/ln
Level of service, LOS	E
Capacity for base condition, cb	11302 pc/h

---

Limitations on Weaving Segments

---

Analyzed	If Max Exceeded See Note	
	Maximum	Note
Weaving flow rate, Vw	2154	4000 a
Average flow rate (pcphpl)	2273	2350 b
Volume ratio, VR	0.19	0.80 c
Weaving ratio, R	0.43	N/A d
Weaving length (ft)	1150	2500 e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

# HCS2000: Freeway Weaving Release 4.1

Ryan  
Austin-Foust Associates

Phone: 714 667-0496

Fax:

E-mail:

---

## Operational Analysis

---

Analyst:

Agency/Co.:

Date Performed: 6/27/2008

Analysis Time Period: AM

Freeway/dir or Travel: South Bound 405

Weaving Location: North of GOLDENWEST

Jurisdiction:

Analysis Year: 2030

Description: HBfreeway

---

## Inputs

---

Freeway free-flow speed, SFF	65	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1750	ft
Terrain type	Level	
Grade	%	
Length	mi	
Weaving type	A	Multilane or C-D
Volume ratio, VR	0.14	
Weaving ratio, R	0.48	

---

## Conversion to pc/h Under Base Conditions

---

	Non-Weaving	Weaving			
	V	V	V	V	
	A-C	B-D	A-D	B-C	
/volume, V	8456	80	750	680	veh/h
Peak-hour factor, PHF		0.90	0.90	0.90	0.90
Peak 15-min volume, v15		2349	22	208	189
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	9489	89	841	763	pc/h

D-37

---

## Weaving and Non-Weaving Speeds

---

	Weaving	Non-Weaving
Weaving intensity factor, Wi	0.91	0.50
Weaving and non-weaving speeds, Si	43.80	51.66
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)	1.34	
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40	
Type of operation is	Unconstrained	

---

Weaving Segment Speed, Density, Level of Service and Capacity

---

Weaving segment speed, S	50.37 mph
Weaving segment density, D	44.40 pc/mi/ln
Level of service, LOS	F
Capacity for base condition, cb	10950 pc/h

---

Limitations on Weaving Segments

---

Analyzed	If Max Exceeded See Note	
	Maximum	Note
Weaving flow rate, Vw	1604	2800 a
Average flow rate (pcphpl)	2236	2350 b
Volume ratio, VR	0.14	0.20 c
Weaving ratio, R	0.48	N/A d
Weaving length (ft)	1750	2500 e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

# HCS2000: Freeway Weaving Release 4.1

Ryan  
Austin-Foust Associates

Phone: 714 667-0496

Fax:

E-mail:

---

## Operational Analysis

---

Analyst:

Agency/Co.:

Date Performed: 6/27/2008

Analysis Time Period: AM

Freeway/dir or Travel: South Bound 405

Weaving Location: South of BEACH

Jurisdiction:

Analysis Year: 2030

Description: HBfreeway

---

## Inputs

---

Freeway free-flow speed, SFF	65	mph
Weaving number of lanes, N	5	
Weaving segment length, L	2400	ft
Terrain type	Level	
Grade	%	
Length	mi	
Weaving type	A	Multilane or C-D
Volume ratio, VR	0.12	
Weaving ratio, R	0.19	

---

## Conversion to pc/h Under Base Conditions

---

	Non-Weaving	Weaving			
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	9112	30	240	1050	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	2531	8	67	292	v
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	10225	33	269	1178	pc/h

D-39

---

## Weaving and Non-Weaving Speeds

---

	Weaving	Non-Weaving
Weaving intensity factor, Wi	0.71	0.39
Weaving and non-weaving speeds, Si	47.15	54.55
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)	1.28	
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40	
Type of operation is		Unconstrained

---

Weaving Segment Speed, Density, Level of Service and Capacity

---

Weaving segment speed, S	53.52 mph
Weaving segment density, D	43.74 pc/mi/ln
Level of service, LOS	F
Capacity for base condition, cb	11539 pc/h

---

Limitations on Weaving Segments

---

	If Max Exceeded See Note		
Analyzed	Maximum	Note	
Weaving flow rate, Vw	1447	2800	a
Average flow rate (pcphpl)	2341	2350	b
Volume ratio, VR	0.12	0.20	c
Weaving ratio, R	0.19	N/A	d
Weaving length (ft)	2400	2500	e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

Ryan  
Austin-Foust Associates

Phone: 714 667-0496

Fax:

E-mail:

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Operational Analysis

---

Analyst:

Agency/Co.:

Date Performed: 6/27/2008

Analysis Time Period: PM

Freeway/dir or Travel: North Bound 405

Weaving Location: North of Beach

Jurisdiction:

Analysis Year: 2030

Description: HBfreeway

---

Inputs

---

Freeway free-flow speed, SFF	65	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1750	ft
Terrain type	Level	
Grade	%	
Length	mi	
Weaving type	B	Multilane or C-D
Volume ratio, VR	0.26	
Weaving ratio, R	0.30	

---

Conversion to pc/h Under Base Conditions

---

	Non-Weaving	Weaving			
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	7936	110	860	2010	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	2204	31	239	558	v
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	8905	123	965	2255	pc/h

D-41

---

Weaving and Non-Weaving Speeds

---

	Weaving	Non-Weaving
Weaving intensity factor, Wi	0.75	0.48
Weaving and non-weaving speeds, Si	46.37	52.28
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)	1.49	
Maximum number of lanes, Nw (max) (Exhibit 24-7)	3.50	
Type of operation is		Unconstrained

---

Weaving Segment Speed, Density, Level of Service and Capacity

---

Weaving segment speed, S	50.59 mph
Weaving segment density, D	48.42 pc/mi/ln
Level of service, LOS	F
Capacity for base condition, cb	11411 pc/h

---

Limitations on Weaving Segments

---

	If Max Exceeded See Note	
Analyzed	Maximum	Note
Weaving flow rate, Vw	3220	4000 a
Average flow rate (pcphpl)	2449	2350 b
Volume ratio, VR	0.26	0.80 c
Weaving ratio, R	0.30	N/A d
Weaving length (ft)	1750	2500 e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

HCS2000: Freeway Weaving Release 4.1

Ryan  
Austin-Foust Associates

Phone: 714 667-0496

Fax:

E-mail:

---

Operational Analysis

---

Analyst:

Agency/Co.:

Date Performed: 6/27/2008

Analysis Time Period: PM

Freeway/dir or Travel: North Bound 405

Weaving Location: North of GOLDENWEST

Jurisdiction:

Analysis Year: 2030

Description: HBfreeway

---

Inputs

---

Freeway free-flow speed, SFF	65	mph
Weaving number of lanes, N	5	
Weaving segment length, L	2150	ft
Terrain type	Level	
Grade	%	
Length	mi	
Weaving type	A	Multilane or C-D
Volume ratio, VR	0.12	
Weaving ratio, R	0.15	

---

Conversion to pc/h Under Base Conditions

---

	Non-Weaving	Weaving		
	V	V	V	V
	A-C	B-D	A-D	B-C
Volume, V	9472	10	190	1050
Peak-hour factor, PHF		0.90	0.90	0.90
Peak 15-min volume, v15		2631	3	53
Trucks and buses	2	2	2	2
Recreational vehicles	0	0	0	0
Trucks and buses PCE, ET		1.5	1.5	1.5
Recreational vehicle PCE, ER		1.2	1.2	1.2
Heavy vehicle adjustment, fHV		0.990	0.990	0.990
Driver population adjustment, fP		1.00	1.00	1.00
Flow rate, v	10629	11	213	1178
				pc/h

D-43

---

Weaving and Non-Weaving Speeds

---

	Weaving	Non-Weaving
Weaving intensity factor, Wi	0.78	0.43
Weaving and non-weaving speeds, Si	45.82	53.54
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)	1.22	
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40	
Type of operation is		Unconstrained

---

Weaving Segment Speed, Density, Level of Service and Capacity

---

Weaving segment speed, S	52.52 mph
Weaving segment density, D	45.82 pc/mi/ln
Level of service, LOS	F
Capacity for base condition, cb	11457 pc/h

---

Limitations on Weaving Segments

---

	If Max Exceeded See Note	
Analyzed	Maximum	Note
Weaving flow rate, Vw	1391	2800 a
Average flow rate (pcphpl)	2406	2350 b
Volume ratio, VR	0.12	0.20 c
Weaving ratio, R	0.15	N/A d
Weaving length (ft)	2150	2500 e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

HCS2000: Freeway Weaving Release 4.1

Ryan  
Austin-Foust Associates

Phone: 714 667-0496

Fax:

E-mail:

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Operational Analysis

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Analyst:

Agency/Co.:

Date Performed: 6/27/2008

Analysis Time Period: PM

Freeway/dir or Travel: North Bound 405

Weaving Location: South of Beach

Jurisdiction:

Analysis Year: 2030

Description: HBfreeway

---

Inputs

---

Freeway free-flow speed, SFF	65	mph
Weaving number of lanes, N	5	
Weaving segment length, L	2000	ft
Terrain type	Level	
Grade	%	
Length	mi	
Weaving type	A	Multilane or C-D
Volume ratio, VR	0.20	
Weaving ratio, R	0.09	

---

Conversion to pc/h Under Base Conditions

---

	Non-Weaving	Weaving			
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	8504	70	1980	190	veh/h
Peak-hour factor, PHF		0.90	0.90	0.90	0.90
Peak 15-min volume, v15		2362	19	550	53
Trucks and buses	2	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	9543	78	2222	213	pc/h

D-45

---

Weaving and Non-Weaving Speeds

---

	Weaving	Non-Weaving
Weaving intensity factor, Wi	2.29	0.35
Weaving and non-weaving speeds, Si	31.72	55.80
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)	1.70	
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40	
Type of operation is	Constrained	

---

Weaving Segment Speed, Density, Level of Service and Capacity

---

Weaving segment speed, S	48.38 mph
Weaving segment density, D	49.84 pc/mi/ln
Level of service, LOS	F
Capacity for base condition, cb	10760 pc/h

---

Limitations on Weaving Segments

---

	If Max Exceeded See Note	
Analyzed	Maximum	Note
Weaving flow rate, Vw	2435	2800 a
Average flow rate (pcphpl)	2411	2350 b
Volume ratio, VR	0.20	0.20 c
Weaving ratio, R	0.09	N/A d
Weaving length (ft)	2000	2500 e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

HCS2000: Freeway Weaving Release 4.1

Ryan  
Austin-Foust Associates

Phone: 714 667-0496

Fax:

E-mail:

---

Operational Analysis

---

Analyst:

Agency/Co.:

Date Performed: 6/27/2008

Analysis Time Period: PM

Freeway/dir or Travel: South Bound 405

Weaving Location: North of BEACH

Jurisdiction:

Analysis Year: 2030

Description: HBfreeway

---

Inputs

---

Freeway free-flow speed, SFF	65	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1150	ft
Terrain type	Level	
Grade	%	
Length	mi	
Weaving type	B	Multilane or C-D
Volume ratio, VR	0.29	
Weaving ratio, R	0.48	

---

Conversion to pc/h Under Base Conditions

---

	Non-Weaving	Weaving		
	V	V	V	V
	A-C	B-D	A-D	B-C
Volume, V	6992	80	1490	1380
Peak-hour factor, PHF		0.90	0.90	0.90
Peak 15-min volume, v15		1942	22	414
Trucks and buses	2	2	2	2
Recreational vehicles	0	0	0	0
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990
Driver population adjustment, fP	1.00	1.00	1.00	1.00
Flow rate, v	7846	89	1672	1548
				pc/h

D-47

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Weaving and Non-Weaving Speeds

---

	Weaving	Non-Weaving
Weaving intensity factor, Wi	0.91	0.60
Weaving and non-weaving speeds, Si	43.80	49.32
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)	1.96	
Maximum number of lanes, Nw (max) (Exhibit 24-7)	3.50	
Type of operation is		Unconstrained

---

Weaving Segment Speed, Density, Level of Service and Capacity

---

Weaving segment speed, S	47.59 mph
Weaving segment density, D	46.88 pc/mi/ln
Level of service, LOS	F
Capacity for base condition, cb	10663 pc/h

---

Limitations on Weaving Segments

---

Analyzed	If Max Exceeded See Note	
	Maximum	Note
Weaving flow rate, Vw	3220	4000 a
Average flow rate (pcphpl)	2231	2350 b
Volume ratio, VR	0.29	0.80 c
Weaving ratio, R	0.48	N/A d
Weaving length (ft)	1150	2500 e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

HCS2000: Freeway Weaving Release 4.1

Ryan  
Austin-Foust Associates

Phone: 714 667-0496

Fax:

E-mail:

---

Operational Analysis

---

Analyst:

Agency/Co.:

Date Performed: 6/27/2008

Analysis Time Period: PM

Freeway/dir or Travel: South Bound 405

Weaving Location: North of GOLDENWEST

Jurisdiction:

Analysis Year: 2030

Description: HBfreeway

---

Inputs

---

Freeway free-flow speed, SFF	65	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1750	ft
Terrain type	Level	
Grade	.	%
Length		mi
Weaving type	A	Multilane or C-D
Volume ratio, VR	0.21	
Weaving ratio, R	0.48	

---

Conversion to pc/h Under Base Conditions

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	Non-Weaving	Weaving		
	V	V	V	V
	A-C	B-D	A-D	B-C
Volume, V	7424	100	1020	930
Peak-hour factor, PHF	0.90	0.90	0.90	0.90
Peak 15-min volume, v15	2062	28	283	258
Trucks and buses	2	2	2	2
Recreational vehicles	0	0	0	0
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990
Driver population adjustment, fP	1.00	1.00	1.00	1.00
Flow rate, v	8331	112	1144	1043
				pc/h

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Weaving and Non-Weaving Speeds

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	Weaving	Non-Weaving
Weaving intensity factor, Wi	2.27	0.33
Weaving and non-weaving speeds, Si	31.82	56.33
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)	1.66	
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40	
Type of operation is		Constrained

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Weaving Segment Speed, Density, Level of Service and Capacity

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Weaving segment speed, S	48.62 mph
Weaving segment density, D	43.73 pc/mi/ln
Level of service, LOS	F
Capacity for base condition, cb	10540 pc/h

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Limitations on Weaving Segments

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	If Max Exceeded See Note		
Analyzed	Maximum	Note	
Weaving flow rate, Vw	2187	2800	a
Average flow rate (pcphpl)	2126	2350	b
Volume ratio, VR	0.21	0.20	c
Weaving ratio, R	0.48	N/A	d
Weaving length (ft)	1750	2500	e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

HCS2000: Freeway Weaving Release 4.1

Ryan  
Austin-Foust Associates

Phone: 714 667-0496  
E-mail:

Fax:

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Operational Analysis

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Analyst:  
Agency/Co.:  
Date Performed: 6/27/2008  
Analysis Time Period: PM  
Freeway/dir or Travel: South Bound 405  
Weaving Location: South of BEACH  
Jurisdiction:  
Analysis Year: 2030  
Description: HBfreeway

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Inputs

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Freeway free-flow speed, SFF	65	mph
Weaving number of lanes, N	5	
Weaving segment length, L	2400	ft
Terrain type	Level	
Grade	%	
Length	mi	
Weaving type	A	Multilane or C-D
Volume ratio, VR	0.19	
Weaving ratio, R	0.46	

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Conversion to pc/h Under Base Conditions

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	Non-Weaving	Weaving		
	V	V	V	V
	A-C	B-D	A-D	B-C
Volume, V	8080	80	1060	900
Peak-hour factor, PHF		0.90	0.90	0.90
Peak 15-min volume, v15		2244	22	294
Trucks and buses	2	2	2	2
Recreational vehicles	0	0	0	0
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2
Heavy vehicle adjustment, fHV	0.990	0.990	0.990	0.990
Driver population adjustment, fP	1.00	1.00	1.00	1.00
Flow rate, v	9067	89	1189	1010
				pc/h

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Weaving and Non-Weaving Speeds

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	Weaving	Non-Weaving
Weaving intensity factor, Wi	1.84	0.27
Weaving and non-weaving speeds, Si	34.37	58.20
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)	1.68	
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40	
Type of operation is		Constrained

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Weaving Segment Speed, Density, Level of Service and Capacity

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Weaving segment speed, S	51.31 mph
Weaving segment density, D	44.26 pc/mi/ln
Level of service, LOS	F
Capacity for base condition, cb	11067 pc/h

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Limitations on Weaving Segments

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	If Max Exceeded See Note	
Analyzed	Maximum	Note
Weaving flow rate, Vw	2199	2800 a
Average flow rate (pcphpl)	2271	2350 b
Volume ratio, VR	0.19	0.20 c
Weaving ratio, R	0.46	N/A d
Weaving length (ft)	2400	2500 e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)





## MEMORANDUM

TO: TJ Nathan, PBS&J

FROM: Terry Austin

DATE: June 13, 2008

SUBJECT: **RIP CURL PROJECT ALTERNATIVES**

This memo discusses project Alternatives 3 and 4 for the proposed Ripcurl development. The purpose is to summarize the traffic impacts of these two alternatives compared to the proposed project.

Alternatives 3 and 4 have land use intensities that are different from the proposed project and hence will have different trip generation characteristics. Alternative 3 eliminates the 10,000 sf of retail use, and Alternative 4 reduces the residential units and the commercial space to 385 units and 8,500, respectively. The trip generation for these alternatives compared to the trip generation for the proposed project is as follows:

Alternative	AM Peak Hour			PM Peak Hour			ADT
	In	Out	Total	In	Out	Total	
Proposed Project	42	162	204	155	91	246	2,640
Alternative 3	39	160	199	146	81	227	2,425
Alternative 4	37	142	179	136	80	216	2,305

With respect to traffic impacts, the PM peak hour inbound volume is the most critical. As shown in Chapter 4.0 of the traffic report (page 4-8), the project contributes 1.09 percent to the intersection capacity utilization (ICU) deficiency at the I-405 southbound ramps intersection with Center Avenue.

When the actual project impact trips are calculated by deducting trips generated by existing uses from the total project trip generation, the inbound peak hour volumes compare as follows:

PM PEAK HOUR INBOUND PROJECT TRIPS		
	<b>Volume</b>	<b>Percent Reduction</b>
Proposed Project	120	--
Alternative 3	111	-7%
Alternative 4	101	-16%

Based on these reductions, Alternative 3 would not reduce the project impact below the significance level of 1.00 percent whereas Alternative 4 would reduce the level of impact to below significance.